

Practical Bee - Master:

IN WHICH WILL BE SHEWN
HOW TO MANAGE BEES
EITHER IN STRAW HIVES OR IN BOXES,
WITHOUT DESTROYING THEM,
AND WITH MORE EASE, SAFETY, AND PROFIT, THAN
BY ANY METHOD HITHERTO MADE PUBLIC, VIZ.

I. To manage BEES in Straw Hives, with NEW CONSTRUCTED TOPS, at a small expence, as profitably and easily as with BOXES.

II. In BOXES of an IMPROVED and cheap Construction, easily to be managed, and with so little DISTURBANCE to the BEES, that all the necessary Operations may be performed without any Danger.

III. To CATCH and secure the QUEEN or to take her and a Swarm to any place you please.

IV. To cause BEES to quit a Hive, and to be so tractable as to suffer themselves to be HANDLED without Stinging.

V. Several Methods of SWARMING BEES Artificially.

VI. To cause a Swarm to work in separated Glasses, without any Hive; or in globular or other glasses, so that

pure Virgin Honey may be taken when in its UTMOST PERFECTION.

VII. To prevent or cause BEES to swarm.

VIII. To take the Honey and yet preserve the BEES, with common Hives only.

IX. To unite Casts, Swarms, and Stocks.

X. A Catalogue of, and Observations on, the most proper Flowers or Pasturage for BEES.

XI. An easy and certain Method of preserving Stocks in Winter and cold Springs.

XII. Several new and improved Methods of extracting the Wax from the Combs, two of them without either Straining or Pressing; and each by a single Operation: but more perfectly, and with far less Trouble and Expence of Fuel than hitherto practiced.

TOGETHER WITH SUCH FULL AND PLAIN DIRECTIONS

That the meanest COTTAGER may attain this profitable ART
Without DIFFICULTY, and at a small EXPENCE;

INTERSPERSED WITH OCCASIONAL

S T R I C T U R E S

On Mr. THOMAS WILDMAN'S TREATISE ON BEES:

WITH SEVERAL NEW DISCOVERIES AND IMPROVEMENTS,
THE RESULT OF LONG EXPERIENCE,

AND DEDUCED FROM ACTUAL EXPERIMENTS,

BY J O H N K E Y S,

B E E - M A S T E R.

L O N D O N:

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Practical Bee-Master

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HOW TO MANAGE BEES
ENTER IN STRAW HIVES OR IN BEEHIVES
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BY ANY METHOD HERETO MADE PUBLIC

ENTERED in the HALL-BOOK

OF THE
COMPANY OF STATIONERS

ACCORDING TO

An Act of Parliament,

December 5, 1780.



AND PRINTED FROM ACTUAL REVISIONS
BY J. O. H. K. E. Y.
B. E. E. M. A. S. T. A.

P R E F A C E.

THOUGH it is not the happy lot of every author to have been nursed on classic ground, yet when any publications have tended more to the benefit than to the mere amusement of the public, the candid have in general kindly thrown a veil over their imperfections in style and manner. The writer of the following pages, the fruits of his evening hours, as none other can be spared from more important avocations, thinking they may, on account of their general utility, have some claim to this indulgence, has presumed to lay them before the public. He pretends not, however, to be wholly disinterested in this publication, but acknowledges that he has some regard to his own interest, as well as to the public good.

A natural predilection in favour of these useful and entertaining insects, first introduced him to their acquaintance. But not meeting with the expected satisfaction from the rules and directions of the most generally approved authors, he was induced to

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make a great variety of experiments ; in the course of which he incurred a considerable expence, and suffered much smart. He thought himself, however, amply repaid by their result, which was entirely to his own satisfaction, and highly worthy, if vanity and self-love do not deceive him, of general notice ; whether his discoveries be really fit to be encouraged, or consigned to oblivion, he now submits to the judgment of the impartially skilful.

As every circumstance either unnecessary in real practice, or impracticable in itself, except a few which are selected for their novelty, is omitted ; a greater scope is allowed for the descriptions, which are particularly minute on the account of novices ; who would otherwise meet with many and even insuperable difficulties.

A great number of prevailing, though destructive, errors are here pointed out, and many new improvements and discoveries substituted.

The best methods of conducting the various operations are so particularly and plainly described, as to render the practice familiar and easy to farmers and cottagers in general : for want of which, works of this kind have hitherto rather discouraged than promoted a general keeping of Bees.

The author hopes, however, that this treatise will enable the country people to overcome the most formidable obstacles,
viz.

P R E F A C E.

viz. the little profit and often great decrease, or even the total loss of their Stocks, in the usual modes of practice; or the too great expence, loss of time, and smart, attendant upon most of the improved ones yet offered to the public: to which may be added the danger, insufficiency, and uncertainty of them all.

The inquisitive mind will also meet with some things worthy of attention. Particular instructions will be given how to manage boxes and glasses of various figures, and in different arrangements, as well for entertainment as emolument. As to what is merely speculative on the nature of Bees, it being totally incompatible with the Author's practical plan, he refers the curious to *The Natural History of Bees*,* where they will meet with a very pleasing and accurate account.

It would be entirely labour lost, should this method, through over refinement, be not adapted to the general use of the peasantry of Great Britain and Ireland. It is from them, and them alone, that any considerable national increase of honey and wax is to be looked for: but as very few of this great multitude have any tolerable knowledge of conducting the many necessary operations of Bees, this branch of rural œconomy is greatly neglected. Bees,

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* Published by Knapton and Faillant, 1744.

with proper management, are capable of multiplying prodigiously; and it may be asserted, without any exaggeration, that there might be five thousand times more honey and wax produced than there is at present, were every farmer and cottager to keep a reasonable number of Stocks; for then all the honey and wax that the vegetables of these kingdoms are capable of supplying, would be as regularly collected by these industrious insects, as the corn from the fields, or the fruits from the trees; and thereby prevent the necessity these realms are now under, of importing great quantities of these very useful articles from foreign countries, very much to the national loss.

It is readily acknowledged, that there is more trouble and more expence attending the method here proposed, than the old one of suffocation; but, if the profits be trebled, or even doubled, a person must pay very little regard to his own interest, who should prefer the old and least advantageous method. What advantages would attend the keeping of poultry and pigs, if a very considerable portion of care and expence were not bestowed upon them?

Though Bees, with little comparative trouble and expence, afford great profits, yet it is much to be apprehended that there will be no considerable increase of these beneficial insects, unless the patriotic and benevolent gentry in every county will make

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make a point of setting an example, and directing a portion of their accustomed liberality to this purpose. Rustics are, of all people, the last in adopting any *new* practices, though the *old* be ever so evidently absurd. No reasoning, however clear and strong, is able to conquer either their obstinacy or their prejudices. It is only by examples of superior gain, that they can be roused to deviate from their usual track, and induced to follow any practice they have once either neglected or despised.

The most probable method of attaining this certainly desirable object, would be to present a Swarm of Bees and a couple of new constructed straw hives to poor cottagers of good characters; at the same time binding them, by an absolute, promise to manage them according to the directions, or book, of their kind donors. This, though at first of small value, would in time prove not only of great public utility, but would also be so very beneficial to the poor families themselves, as, by the increase and produce, to afford raiment to the naked, food to the hungry, and make the humble habitations of many, who are now miserable through extreme poverty, comfortable and joyous: while the benign hearts of their humane benefactors would feel such transports of happiness and satisfaction, on contemplating the change, as would amply recompence

recompence them for the little charge and trouble it might require.

There is, it must be acknowledged, some risque that these laudable intentions may be frustrated, and the proposed advantages, not gained, unless the same benevolence which first gave the hives, would also condescend from time to time, and by casual visits, to inspect their management, and observe whether the directions given be conformed to. Even this, perhaps, may be insufficient for the intended purpose, should any of these laborious insect communities be consigned to the lazy or the sottish: but, Heaven forbid, that the sweet profits of the temperate and industrious Bees should be squandered abroad in riot and excess, while the distressed wife and children are pining at home with want, or perishing by the piercing severity of the winter's cold!

Great, very great, are the charitable benefactions of the inhabitants of these kingdoms! but equally great are the insolence and profligacy of the lower class of people! But, to throw out a hint, might not these very benefactions be made subservient to a general reformation, by bestowing them on none but the sober, the industrious, and the well-behaved? Would not this conduct, if general, excite a spirit of emulation among the poor to excel in virtue: as well knowing, that without this recommendation, they would certainly be deprived of all hopes of protection and encouragement?

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couragement? Here it is to be lamented; that the most vicious are likewise the most pushing, and by their impudence can obtrude themselves into notice; while the virtuous, too meek perhaps, and submissive, are intimidated from asking, and must therefore be sought out. Thus patient merit starves, while the miscreant riots on what would have made a whole virtuous family grateful, comfortable, and happy! The Author's situation in life has afforded him ample opportunities for these observations, which those in higher stations are necessarily deprived of; he therefore hopes this digression will be thought not altogether impertinent.

After all, perhaps, the only method of establishing a proper mode of managing Bees, so as to become universal and permanent, would be for some person in every neighbourhood to make himself perfect in the art: he might then superintend and manage his neighbours Bees at a moderate stipulated price for each Stock, through the year; in a similar manner to those who go from house to house to brew, &c. Many, who through age and infirmities are rendered unfit for hard labour, might easily acquire and practise this art to their own benefit, and that of the public.

Some, who already keep Bees, may object that the Author has inserted many well known particulars: such should consider that

* P R E F A C E.

that he writes for the totally ignorant, as well as for those who have some previous knowledge; that he means to instruct in the whole art, and not in a part only. But, should the objector save only one hive of Bees by the methods here pointed out, though taught by a single Paragraph, there surely can be no cause of complaint; as the saving will be much more than the whole purchase of the book.

Should this treatise merit a second edition, any useful practical information or corrections shall be properly inserted; it being the Writer's ardent wish that this beneficial art be brought as near perfection as possible. Such communications addressed to the Author, will be gratefully acknowledged.

The Writer hopes that the critics will be tender of this his only child; the child of his old age; which, though now weak, sickly, and helpless, he flatters himself, may, by a little of their kind assistance, become extensively useful.

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THE
PRACTICAL
BEE-MASTER.

CHAPTER I.

Of the NATURE and QUALITIES of the
QUEEN BEE.

1. **T**O have a competent knowledge of the proper management of BEES, it is first of all necessary to be well acquainted with their nature and qualities: For it must surely be deemed absurd in any one to attempt to govern a people, without knowing any thing of their manners, customs, and propensities.

2. Each Stock of Bees, and also each Swarm, is composed of three sorts, or classes, viz. the Queen, (fig. 1.) the Drones, (fig. 2.) and the Working Bees, (fig. 3.)

3. The Queen is the *Common Mother* (in the strictest sense of the word) of the whole
B Stock.

Stock. Several modern authors however have not only dignified her with this title, but have also attributed to her a regal power and polity, similar to *that* known among our species. Such flights of fancy may be allowed to poets, but of the natural historian it is required to delineate with truth and accuracy, and without any exaggeration.

Though I have myself paid very great attention to this point, yet I could never observe any such instances of sovereignty; nor am I singular in *this* opinion, having Monsieur Reaumur to countenance me; for he observes, "If she reigns it is over subjects that every moment know the good of their society demands what they perform; and who therefore never fail to do it. From this source flows their unparalleled attachment, tenderness, and respect. They never have occasion to receive orders. Both Queen and People invariably pursue the designs of Nature." Notwithstanding the great names of Locke and Hoadly, female government seems to have been the *first* among men; for we find Eve governed Adam, and made him do a very foul thing. So among Bees, the *Matriarchal* was also the *first*, and is the *only* one that has been admitted among them (from the beginning: However as custom has dignified the Parent Bee with the title of Queen, we shall distinguish her by that appellation through the succeeding pages.

5. Her importance among Bees is much greater than that of the greatest monarch among the sons of men. Without *Her* the whole stock or family, would be soon extinguished. Should a natural or accidental death deprive any Stock of their Queen, confusion, sorrow, and neglect inevitably succeed. They then barely work for immediate subsistence, and for a very short time; for having no prospect of a future race, they pine and languish until famine and death put a period to their grief.

6. With respect to figure, the Queen, (fig. 1.) is longer and more slender than the Drones; the hinder part tapering almost to a point; her belly and legs are yellower than those of the common Bees; the upper part of her body is of a much darker colour, nearly approaching to a glossy black; as is also the tapering part beyond her wings, which is divided into four joints, distinguished by as many circles, whereas the common Bees have but three circles, and those of a lighter colour; and the nearer she is to the season of depositing her eggs, the more shining and large she appears. Her wings are very short in proportion to her body, hardly reaching beyond the middle and ending about the third ring, whereas those of the common Bees and Drones cover their whole body: so that upon the whole she seems rather clumsy, and is not unlike a tall woman with a very short cloak; but in her deportment, she is grave, solemn, and calm.

7. She is armed with a sting, which is neither so large nor so long as those of the Commoners; its use, however, I cannot precisely determine; as the roughest usage, even to pressing many of them to death in my hands, could never provoke a Queen to sting me, though they seemed to dart their stings out for that purpose. But having placed two Queens together under a glass, I observed that they stabbed each other, until death ended the combat.

8. Perhaps this unwillingness in the Queen to sting on any other occasion, may be owing to her consciousness, that on her preservation, depends the happiness and prosperity of her numerous offspring. For of her fruitfulness one may say, "that her progeny is like the sand upon the sea shore." To bring forth young is the whole of her duty, and this important office her children know to be absolutely necessary to their mutual prosperity, and is the measure of that affectionate solicitude they bear her. To this single circumstance may all those shining qualities of royalty be reduced.

9. It might seem too fabulous to relate, had not that great and indefatigable Naturalist, Mons. Reaumur, ascertained the fact by accurate examination, that a single Queen, in the course of seven weeks, can produce ten or twelve thousand young; and that she commonly brings forth from thirty to forty thousand in nine months. Some, however, are more prolific than others.

10. This

10. This is further confirmed by another very eminent Naturalist, Swammerdam. He discovered in the body of a Queen Bee ready to lay, an ovarium, or egg bag, containing five thousand one hundred visible eggs: And if so, there can be no difficulty in supposing her capable of producing so numerous an offspring in so short a time.

11. About the middle of the spring is the height of her laying: from many circumstances it is very probable that she then lays about two hundred eggs a day. However prodigious this may seem to those not conversant with natural history, several animals surpass the Queen Bee in fecundity.

12. But this surprize will be greatly heightened by reflecting upon a faculty still more wonderful, that of appearing to be endowed with a power of keeping in her body eggs that have been impregnated several months before; or, (which amounts to the same) the seed of the male, capable of vivifying the eggs at the time of their exclusion. For, though the Drones, who are the males, are seldom suffered to remain in the hives (581) longer than the middle of August, yet the Queen still continues to lay eggs and produce young, not only in Autumn, but also in the next Spring, until March or April, and in great abundance, all by virtue of the Autumnal impregnation. Nor is this faculty confined to the Queen Bee, as Wasps, Hornets, and some other insect tribes do the same.

13. That the Drones have any agency at all in propagation, has been elaborately disputed by the Rev. Mr. Thorly; * nor does he seem to think them of any other use whatever; as though Providence had made a *distinction* without designing it to answer any particular purpose.

14. Butler, however, who wrote long before, viz. in 1623, † differs widely from him in sentiment, and seems to be not only the *first* discoverer of their sex, but also of that of the Queen. He has maintained his opinion with greater weight of argument, which later experience has fully confirmed.

15. Notwithstanding the prying eyes of so many philosophers and naturalists in every age, the mysteries of love remained an impenetrable secret until the superior inquisitive genius of Reaumur lifted up the veil and ushered them into day. To obtain this discovery, he confined a Queen and a Drone in a glass, and there had his most sanguine wishes compleatly satisfied by being an eye witness of the nuptial consummation. His joy, however, at this fortunate discovery was not without some alloy, in beholding several single Drones, he had accommodated her Majesty with, die at her feet, through excess of amorous toil. From this circumstance it fully appears, that a small number of males are wholly insufficient

* Enquiry into the Nature, &c. of Bees, 1765.

† Female Monarchy.

sufficient for the arduous task; and that a large number, generally seven or eight hundred, are required to impregnate the many thousand eggs deposited by the Queen.

16. But as Thorley has degraded the Drones from their office, and has represented them as unprofitable and useless, so have we an antagonist against the Queen, in Mr. Daniel Wildman, (nephew to the famous Mr. Thomas Wildman) who, in his small pamphlet,* has attempted to render her equally insignificant.

17. He asserts, that the opinion of the Queen being the general parent of the whole Stock, "is absolutely without foundation." He further says, "They (the common Bees) couple together, I make no doubt, though privily, and apart by themselves, though they never were observed, yet they certainly apply themselves to that business secretly within the hives, or else abroad where there can be no witnesses."

18. In answer to this, it may surely be urged, that as among so many millions of Bees, which many people possess, and among so many watchful eyes of naturalists and others, no such conjunction has ever been noticed, either in glass hives, or when the Bees have been abroad, it is by no means unreasonable or unwarrantable to assert, that it is highly improbable any such connections

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* Complete Guide for the Management of Bees, 1775.

ever take place. We know that all other insects have no regard to what we call modesty or decency among us; therefore such delicacy in Bees, and in Bees alone, is superlatively astonishing.

19. To this it may perhaps be replied, that neither has the engendering of the Queen and Drones, ever been discovered in glass or other hives; I grant it. The case, however, is by no means parallel. Here is a single insect amongst a vast multitude, by whom she is constantly surrounded; whose residence likewise is always in the centre of the hive, and consequently her person continually veiled from human eyes; except when she is depositing eggs near the extremities of the combs.

Reaumur relates, that he kept Bees in glass hives many years, but could never obtain a view of the amours of the Queen and Drones. I have placed a Swarm in seven glasses, each holding three pints, and having a common communication with each other at bottom; yet, notwithstanding the Bees were thus divided, the Queen was seen but twice the whole season; much less could any observations be made of a royal wedding.

20. But there is another insuperable objection to Mr. Daniel Wildman's principle: For although no one ever saw them engender, some one must have seen them deposit their eggs. But who ever saw a working Bee with its *Tail* in a cell? With their *Heads* they are continually seen so, in order to deposit their

their loads; and whether alive or dead, are always found with their heads towards the bottoms of the cells. Therefore Mr. Wildman must grant that they lay their eggs at their mouths. I have several times held Queens in my hand who, while there, have laid their eggs, and in the same way as all other creatures do. Working Bees I frequently hold in my hand; and they also have deposited, but never eggs, unless excrement may be so called.

21. Mr. Wildman endeavours to support his doctrine by that best of all proofs, experiment. But it is neither one nor two, but a long series of similar results, that amount to a certainty. He declares he often repeated some particular experiments to determine the point; and gives us an account of one, in which, after taking out the Bees from a hive, he separated from them the old Queen*, and a young one, not yet come to maturity; this last he stuck up in another hive, with a sufficient quantity of Bees with it, and observed at the same time that there were no young Bees in the other common cells. At the end of three or four days he took the Bees out again, and observed *young Bees* in every cell.

22. This experiment, however, appears to me on several accounts a very doubtful one; for he could by no means be certain there

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Although he calls his Treatise complete, the secret how, he reserves to himself.

were no young in the common cells, unless he had taken out and examined each comb separately. But even allowing that there were no young in the cells before, yet how is it possible there could be *young Bees* at the end of three or four days? For it is an incontestable fact, that the egg itself is three days in that state, and five or six more under the appearance of a maggot. Mr. Wildman must therefore most certainly be mistaken in this; as he is also when he affirms that a Royal Bee is five or six weeks hatching.

23. But Mr. Wildman proceeds still further, and observes that there were not only young Bees in the old combs, but also in new combs, which the Bees had built in the course of four days. The young Queen most probably, was not in a sufficient state of maturity to breed these; but it does not follow that some other young Queen, who had eluded his search, did not. I have myself been frequently disappointed in searching for the Queen, and have been obliged to repeat the operation two or three times before I could find her. These experiments therefore, cannot by any means be deemed decisive, especially when attended with so many improbabilities. It would have been more satisfactory had this gentleman acquainted us with the number of combs and Bees put into the hive, and at what season.

We hope he will favour us with some future experiments on this subject, made with

with precision, and in the presence of intelligent persons.

24. In the mean time, to strengthen the arguments already offered in support of our opinion, let us add the testimony of Swammerdam and Reaumur. These gentlemen beheld in the ovarium of a Queen Bee, five thousand three hundred eggs at one time. Now, supposing there had only been half that number, what can such a multitude be designed for, if, as Mr. Wildman asserts, the Queen only produces three or four young? Besides, there never have been found any vestiges of an ovarium in common Bees; therefore, as Mr. Wildman admits that by dissection of a drone the sex may be ascertained, this argument must be allowed to be full as applicable and conclusive when applied to the Queen and the common Bees.

25. Although he does not admit of the Queen being the common mother, yet in several pages he acknowledges, "That without a young Queen there can be no Swarm. That a hive shall be well stocked with honey and Bees, and yet all shall die in the winter, occasioned by the loss of the Queen; for when this happens they will neither work nor eat." I shall make no comments upon this, as it coincides with the general received opinion as to the absolute necessity of a Queen to the prosperity of every Stock or Swarm. Though from him we cannot learn from whence that necessity can possibly arise.

26. I have lately met with another singular sentiment of a foreigner respecting the royal brood, as related to a friend of mine, viz. that by taking any common egg, and fixing it in a royal cell, it will become a young Queen; and this (as he supposes) from the extraordinary supply of food.

That nature should endow a multitude of creatures with such a peculiar construction of vessels, as can be useful only to a few in many millions, is as repugnant to observation and experience, as it is to probability. The Drones are much larger and of a different conformation to the Queen and Commons. Can this arise purely from any peculiarity in the nutriment? The result of such an experiment would more likely be a drone, a heavy clumsy insect, with an obtuse anus, than a Queen, whose body is no thicker than that of a common Bee, but which extends much longer and terminates in a point. We might as well expect that our hens would all produce cock eggs by giving them a double portion of food.

27. That the gentleman might have taken a common egg and placed it in a royal cell, and that a young Queen had been afterwards produced, I will not dispute. For there might be a Queen already in the hive unperceived by him, who might lay a royal egg in that cell, the working Bees having first taken away the common egg. Beside, why should a Queen be capable of furnishing several supernumerary princesses, when
in

In case of miscarriage, the commoners could so easily supply the deficiency? And doubtless these would have been furnished with that instinct or knowledge, had it been so.

28. Let this be as it will; in practice it can be of no consequence or use; as he acknowledged that a common egg must be deposited in a royal cell. To do this the Bees must be drove, and some combs cut out; in doing which a real royal egg may be destroyed, and the rest of the young injured. The operation itself is likewise troublesome. All which inconveniences may easily be avoided, by setting the *Queenless* Stock at night over some other. (382.)

29. Having thus attempted to establish the principles we set out with, we proceed next to treat of the generation of Bees. And, first, the Royal Nursery. This is composed of cells or nests (fig. 4. *a*, *b*.) which are of a circular form, of a considerable thickness, and in appearance rather clumsy; for one of these cells weighs as much as a hundred of the common; the royal cell, when about half made, resembles the lower part of an acorn turned upside down; (fig. 4. *a*.) but it is gradually lengthened in proportion to the growth of the inclosed embryo, until at last it is sealed or covered over at the top with wax (fig. 4. *b*). Sometimes these cells hang from the middle of a comb; but oftener from the sides, ends, or edges of the combs (fig. 4). They hang in a perpendicular direction, with the open end pointing

ing down towards the floor. The number of these cells are various, from two or three to ten or twelve. After the royal brood is out, they are generally taken to pieces, and the wax applied to other uses. But if the wax be not wanted, they are permitted to remain.

30. A young Queen is capable of being fecundated four or five days after her birth, but until then, no Swarm will rise with her; and that sometimes does not happen for some weeks, for want of Drones. Her colour changes to a deeper hue, in proportion to her age; and the nearer she is to her laying-time, the more shining and large she appears.

31. A Swarm has generally the sagacity to single out the forwardest to lead them. Tho' it frequently happens, that some bold virago will intrude, and hazard her life for an empire. But when settled in a hive, she that is ready to lay will be enthroned, and her competitor expelled or slain.

32. The Queen begins to lay in February or sooner, if the weather proves mild, (and proper flowers are in blossom) and will in some situations, continue laying until October. I have taken Stocks often at that time with brood in them. But at what time soever the Bees carry in little balls upon their legs, it may be looked upon as a sure indication of the Queen's breeding.

33. As most of the insect tribes exhibit transformations, which might be accounted
miraculous,

miraculous, were they not so common, to the Bees undergo similar and equally surprising changes, which we shall now endeavour to describe.

The Queen first lays an egg, at the bottom of those holes, or waxen cells, which form the combs (fig. 4); after the egg has remained in this state about three days, it becomes a *maggot*; which lies in the bottom of the cell rolled up in the form of a half moon, and is surrounded with a clammy substance. ~~The Bees continually feed it at the mouth~~ during five or six days. The embryo being then considerably increased in bulk, the cell is closed or sealed over with a covering of wax by the common Bees; having been thus left about twelve days more, the young Bee breaks through this ~~waxen~~ covering, and appears in its perfect form. But a royal egg is longer in hatching than a common one.

34. There is also, and generally in the middle of every hive, a comb appropriated for the Drone brood, the cells being much deeper than the common ones: and when the young are sealed up, instead of a *flat*, they have a convex cover, which is a little oval.

35. The duration of a Queen's life, as also of the inferior Bees, seem to be about a year. The Queen therefore that breeds early in one spring, can hardly be the same that breeds thro' the next and the succeeding summer; I the rather think so, because at times I have

have had Stocks die or dwindle away; for which no other reason could be assigned, but the death of the Queen; none being found upon examination in the hive, though there was plenty of honey. This may, perhaps, explain why sometimes in the spring Bees desert a plentiful hive; the Queen being dead before any royal eggs were deposited.

CHAPTER II.

A DESCRIPTION of the DRONES and COMMON BEES.

36. **T**HE common Bees (fig. 3). being so well known, need no other description than that they are of no sex, being neither male nor female. These are generally, and indeed truly and emphatically called the *Working Bees*.

37. The Drones, (fig. 2.) as we have before observed, are the males: they are both larger and longer than the common Bees, but shaped nearly like them. They are *without* stings; instead of which, their tail end contains the distinguishing characteristic of their sex: and which mere pressure will force

force out of their body. They have no fangs, and are more tender than the Workers. Eight or ten hundred of these are found in a good Stock, whose *sole* designation is the service of the Queen.

37. The tongue of the Drones being shorter than that of the workers, disables them from sucking honey from the flowers, and therefore they are obliged to be sustained by the honey laid up in the hives. Except paying their court to the Queen, they do no work; neither do they stir out of the hive until the sun has warmed the air, and invites them by it's splendor. The sweets of love, a plentiful and delicious table, and a short life, but free from care, from sickness, and from anxiety, is their happy lot. Considered *only* in this point of view, who would not wish to be a Drone?

38. Some have thought, that the bodily heat of the Drones, is necessary in hatching the brood: but I could never observe them in the least attentive to that point. Besides, it is well known that great numbers of Bees are bred early in the spring, long before any Drones are hatched, and when the air is much colder than when these appear; as also long after they are expelled the hives.

39. Several authors are also mistaken in affirming that the brood is wholly deposited in the center of the combs. Numbers of my Stocks have yearly extended their breeding cells quite to the edges of the
C combs,

combs, and close to the windows of the boxes, without suffering any prejudice.—Thorly agrees with me in this observation.

40. I particularly notice this, because it has been a point of consequence in the construction and arrangement of boxes; and thereby has occasioned more trouble and expence than otherwise would have been necessary; but as the principle has no solid foundation; a peculiar construction of boxes for *that purpose* must be needless. The truth is, the Bees breed in our climate, rather too fast than too slow. And they often die in backward springs by having a great number of young mouths to feed from too scanty a larder.

41. The age of a Bee, considered singly, seems to be that of a year; although a Stock, if the combs did not become too foul, might exist for centuries, that is, by *succession*; just as the human race do in populous cities; while some are hourly taken off by age, accident, or infirmities, others are rising into life and manhood, to repair these unavoidable, and even necessary breaches of mortality.

42. Young Bees may be distinguished from the old by their being of a lighter brown colour. Old Bees are more red or dark. The wings of the young are intire; but those of the old shagged and torn by their unremitted labours. A Bee just hatched has a great belly, stuffed out with the sustenance it took whilst a maggot. By these marks
may

DRONES and COMMON BEES. 19

may be distinguished in a swarm the old, the young, and the middle aged.

43. Bees have a quick and an extensive smell, either of honey, or honey dews; but are not disgusted with smells that are disagreeable to us, if not within their hives. In the spring they are often seen sipping in drains, and places wetted with urine. Tar they are fond of, and if in their reach will injure their honey with it.

44. By their acute faculty of smelling (or perhaps by a sense of which we can have no idea) they distinguish the Bees of their own hive from any others; and know from the smell the death of any of their companions crushed or killed about the hive, and will pursue the murderer with unrelenting vengeance.

45. They stop up with a kind of gum-resin, called *propolis*, all the holes or crevices of their hives. Therefore the fewer there are of such in the hives, the more it will ease them, and prevent a loss of time and labour which might be employed more to our profit.

46. They foreknow impending storms, at such times crowding to their hives so thick that the door-ways cannot admit them fast enough. They work day and night in the hive, taking repose by turns; hanging upon each other by their claws between the combs. They also have signs by which they communicate their wants or desires to each other.

47. They are the most cleanly of all creatures (except a Dutch woman) suffering no dirt, filth, or any other offensive thing in their hives. Their own necessary discharges are performed as they fly, and never in their hive, unless compelled thereto by an injudicious closing up of their hives, which generally occasions their death.

48. They are very fierce, and prone to revenge, when provoked; as they will be by strangers standing too near the entrance of their hives, or when any bustle is made near them. Their irritability proceeds from a supposition of some injury being designed against their state; for otherwise they are not apt to sting. When at a distance from their hive, you may beat them from flower to flower, and molest them while in their industrious pursuits; they will then bear it with exemplary patience, nor shew the least resentment, no not even should you catch them in your hand, provided you do not press them.

49. They soon become acquainted with a person who frequents their hives, and seems attentive to please them by his calm and deliberate deportment. They readily will distinguish him from any other person. So far from offering him any insult, they will often light upon him as a mark of their affection. He may even lay his hand at the mouths of their hives, and they will pass over it without the least resentment. But should this same person in any manner disturb

turb the hive, instantly friendship and harmony are destroyed, the pride of their little hearts rises, and they are filled with anger and revenge.

50. Most creatures grow tame to the hand that feeds them; not so the bees, if in doing of it, their hive be in the least disturbed: for no creatures are so fond of peace and quietness.

51. Not that they will bear malice long with the person they have been once familiar with, for in two or three days they will forget the greatest injury he can have done them, and be as cordial with him as ever; but not so with casual visitors, by whom, if once affronted, it is a great chance, but that come near them whenever they will, attempts will be made to give them the most exquisite pain, by stinging their eyes or nose. As the stinging of Bees is sometimes attended with fatal consequences to men and beast, it will by no means be improper to make a distinct Chapter of so very important a subject.

CHAPTER III.

Of the STINGING of BEES.

AS the Bees, though a diminutive people, are armed with weapons which, though small, are so venomous as often to strike men of gigantic might with terror, it is highly proper to consider, before we attempt any familiarity with them, how to defend ourselves from them; and to know when wounded, how to apply a proper remedy.

53. Many persons through an unreasonable dread, cannot suffer a Bee to come near them, without being flurried; and in this state of confusion and terror provoke these otherwise inoffensive insects to sting them, by striking at them. This treatment always raises their resentment; which when thus excited, generally continues for several days; and while it lasts, the Bees will pursue the offender from one end of a garden to the other.

54. The best way, where they come buzzing about you, is to wave your hand gently before your face, and make a low retreat; or stooping down, to thrust your head among herbs, shrubs, or the like; this will be a sufficient security 'till their anger is abated,
and

and they have retired from you. This behaviour will conciliate a more peaceable demeanor towards you another time; and a repetition of it will procure you their friendship.

55. Not but there are some persons against whom Bees will have an invincible antipathy, however calmly and inoffensively they may have always behaved to them. Instances of this sort have very frequently fallen under my observation. Neither has a change of colour in their clothes in the least diminished their rancour, but they would still follow them in every part of the garden from day to day. Whether this dislike proceeds from something disagreeable in the countenance, or in the effluvia of the body, is hard to determine. But it is very clear that such persons must never think of becoming Apiators*, or managers of Bees. Nor indeed any other person who cannot command his temper while employed about them.

56. The Bees are used to a mild parental government, to peace, and quietness; and like some of the heroes of antiquity, will never submit to tyranny or violence, but will resist unto death.

57. In windy or other disagreeable weather, which discomposes them, or hinders
C 4 their

* The adoption of this appellation I hope will be excused, as we have no single word expressive of the meaning.

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their labours, they become very fretful and quarrellsome; at such times, whoever loiters about their hives will be sure to smart for their temerity. So likewise in very hot days, and when there is plenty of honey gathering, their eagerness is so great, that standing before their hives as it obstructs their passage to and fro, will be deemed an affront.

58. Hair and feathers are disagreeable to Bees. But fustian, velvet, and leather, are destructive. For from such substances, they cannot withdraw their stings, but, together with them, leave part of their bowels, and thus soon die. On the contrary, from linen and woollen apparel, they readily disengage their stings, and without receiving any harm. The degree of the inflammation produced by the stinging of a Bee, varies in a double proportion to that peculiarity found in different constitutions, and to the quantity of venom injected. In some people the slightest scratch, or smallest puncture, shall prove highly painful, and be difficultly cured; while in others much deeper wounds shall presently heal without any inconvenience. So in some the stinging of a Bee will immediately occasion a very painful tumour over great part of the body; in others it will be attended with very little pain, and but a small swelling, both which soon subside; except the wound be made in a very sensible part, as the eyes. To me their stinging is of trifling consequence; I had rather be stung by ten Bees on my hands, than
once

once by a stinging nettle. Besides, the Bees are not at all times equally vigorous, so that in proportion to the heat of the weather, and the degree of their anger, a larger or smaller portion of venom will be injected. Nor can a Bee sting more than three times; as its venom will then be quite exhausted.

59. When a Bee has stung any one, it is best to have patience, and permit it to withdraw its sting, which otherwise will be left behind, and the wound be thereby made larger. One method of cure is, to press with some force the hollow end of a key over the wound; this operates by forcing out the venom, and preventing its being conveyed by the absorbent vessels into the circulation. Another method is, with the flap of a woollen coat, or piece of woollen cloth with the knap on, to rub the wound briskly backwards and forwards, in the same direction as the veins, now and then wetting the wound with a little spittle, to prevent the fretting of the skin, and to continue the friction until there be a cessation of the smarting. Or it will be much better perhaps, to rub the wound with the woollen cloth only one way, viz. downwards on the arms, legs, and trunk of the body; but upwards on the face, neck, and breast; by this means the venom will be more thoroughly pressed out and absorbed by the cloth; and its entrance into the absorbent system more effectually prevented.

60. But if the wound be not immediately rubbed, this method will be useless, as the

the poison will have penetrated too far. In this case recourse must be had to some penetrating remedy. Among a multitude of herbs, oils, chemical preparations, &c. that have been tried, the following compositions have been found the most efficacious, from my own personal experience, as well as that of many others.

Take of common linseed oil two parts, vinegar of squills one part, honey one part; these are to be well shaken together. The more speedily this is applied, the more salutary it will prove. Rub it hard in and about the wound with your finger, as long as any smart is felt; and at times afterwards, if any swelling or inflammation remains, this composition will not wholly prevent a tumour, but it will greatly lessen it and alleviate the pain.

61. But in general, sweet spirit of vitriol, rubbed well in, will more effectually prevent any pain or swelling; and may be applied to the most sensible parts, even to the eyes, with safety. But in proportion to the strength of the insect, the quantity of venom injected, the lapse of time before the remedy is applied, and the irritability of the habit, will be the quantity of spirit necessary to a cure. It is not the rubbing a little on will effect it, but as long as any swelling rises, or any pain is felt, so long must the embrocation be continued; and even after

after an intermission, if either should return, the remedy must again be had recourse to.

62. There have been too many melancholy instances of persons, as well as cattle, that have been stung to death by Bees. Perhaps the following directions may in future, at least in some cases, prevent so fatal an accident.

When a person is suddenly beset by these insects, that have been by any means enraged, if any house, stable, or the like be near, he should run and shut himself up in the darkest part of it, and with his handkerchief brush off as many of the Bees as he can. But if they be very numerous, and any other person within call, water should be poured over him to wash them off, as brushing will cause some of them to sting. Where no assistant is nigh, after having been shut up a little while, and having brushed off all he could, he should run away as swiftly as possible to get out of their sight, and immediately afterwards apply some of the above remedies; or, for want of them, any kind of sweet oil, or fresh grease, that can be first obtained, should be rubbed upon the wounds, until a better remedy can be procured.

63. Where no buildings are nigh, he should hide his head, and his whole body, if it can be done, in a hedge, or among bushes, or the like. If none of these be nigh enough to save him, plunging into a pond of water will presently free him from them. Or for want of that the throwing

up of water briskly with his hands so as to fall over himself and the Bees, will induce them to retreat, thinking it a shower of rain. But if no water be near at hand, the throwing up of dust may perhaps have the same effect.

64. When only a few Bees have settled on any person, let him cover his head and neck as well and as close as possible with his clothes; and if these be thick enough to prevent the stings from penetrating, the Bees may soon be driven away by throwing dust or water over them. Care, however, must be taken to keep this covering so close by one hand, or any other fastening, that none of the insects may be able to insinuate themselves under it. If the head and neck be well secured, such wounds as may be elsewhere inflicted cannot be fatal; neither can a few stings received in the face, before it could be covered. And such Bees as may have previously settled on the head and face, can easily and presently be crushed to death by pressing the covering against them. If there be nothing else within reach, the face must be covered with both hands, securing the eyes, nose, and mouth in particular.

65. Whenever any one is very much stung, he should be put to bed as soon as possible. And besides being bathed as before directed, he should drink plentifully of baum tea, water-gruel, or other thin cooling and laxative drink, in which the juice of currants, apples, oranges, &c. may be squeezed. He should eat but little of any thing, and no animal food. If there be much inflammation,

flammation, and the patient be feverish, blood should be taken away as soon as possible; and such other medicines be exhibited as a skilful medical gentleman may think necessary.

66. When a person has the misfortune to be stung in the throat, while medical assistance is fetching, with all possible speed, some mild oil should be gradually swallowed, or for want of this melted fresh butter, or even grease, if nothing else is to be had; for not a moment must be lost. As soon as the medicine composed of sweet oil, vinegar of squils, and honey, can be prepared,* the patient must swallow some of it gradually. Where vinegar of squils cannot speedily be procured, good common vinegar may supply its place.

67. But it must carefully be observed, that the cautions and directions already given are *not* to extend to swarms of Bees, that peaceably and without any provocation leave their hives of their own accord, and settle upon any one. For then, if the eyes, nose, and mouth be secured with the hands or a handkerchief, they will alight on him without doing the least prejudice, provided he remains intirely passive and still, until they have all settled. He may then gently walk with them, until a hive can be obtained, which being rubbed on the inside, at the *top only*, with a mixture of sugar and ale, and

* This I have known succeed; but the sweet spirit of vitriol I have not yet had any opportunity of trying, tho' a tea-spoonful or two may be taken in a little water.

and held over him as near as possible, where the Bees are most numerous, the greater part will soon ascend; he should then walk to some distance from the hive, and those Bees that yet remain upon him, missing their companions, will soon quit their station to join them, unless the Queen should happen to remain behind; in this case, the Bees must be taken off with a spoon (384) and put into the hive.

68. But if instead of observing this peaceable behaviour, he should be hurried, and mistaking or slighting their intended friendship, should strike at, or endeavour to beat them off, they will revenge the affront so as to endanger his life.

69. It is very probable that cattle on such occasions, may be excited to resentment; and although in settling on them they do not sting, yet their crawling may give the creatures some uneasy sensation and cause them to be very testy, and by endeavouring to brush them off, excite the Bees to sting them. In this case, or any other, where cattle are accidentally beset with Bees, or Wasps, &c. they should be driven with the greatest expedition to some pond, where they may, if possible, be covered with water, and the parts that are not so, must have plenty of water thrown on them, to wash off as many Bees as possible, at the same time briskly throwing up water among such Bees as continue the attack. As soon as the enraged insects are retreated, brush off with wet twigs those Bees that

that remain on the animals. When there is no water at hand drive them into a hedge, or which is still better into a stable.

70. If an animal be very much stung, bathe the parts affected with any oil or grease that can be soonest got, that the poison may have less time to spread; whatever is used should be well and long rubbed in, and repeated very often until the inflammation subsides. And if the remedies before mentioned be used, the cure will be more certain and speedy. Bleeding is proper if the inflammation be great, or the creature appears to be in great torture or convulsions.

71. A drink should be given him, of thin oatmeal gruel, in which two ounces of salt petre have been dissolved: this should be repeated at three or four hours distance; it will contribute to diminish the inflammation and alleviate the pain.

72. As it is impossible but those that manage Bees must sometimes be stung, and that severely too, unless they have some proper defence; and as such a safeguard may be provided at a small expence, no Apiator ought in good policy to be without one.

73. The safeguard consists of a hood made of such thin open cloth as milk is usually strained through; any other thin light cloth will do well enough. Head armour composed of this kind of materials will not be very burthensome, and is sufficiently cool. It must be big enough to go over a man's hat, and round the neck, so as to tie before, with a string

string running through a tape or loop holes. That part of it which is opposite the face must be cut out, and a piece of very open gauze, cat-gut, or what is much better and stronger a caul of which barbers make the inside of their wigs, must be sewed therein. Crape or muslin will too much obstruct the sight, when kept at the proper distance, which must be so great that no Bee can reach the face with its sting. The hat must have narrow brims about two inches wide, and unstrung.

Great care must be taken in using this hood, that it be drawn round the neck so tight that no Bee can pass underneath it, and that the part below the neck extends as far as the coat. If there be the least opening left sufficient for the Bees to get under, they will find it out, and before it can be loosened prove worse tormentors than if there had been no defence at all. Therefore let the string be tied with a bow knot, so that if there be occasion, it may be instantly untied and thrown off.

74. A pair of tanned, or other thick leather gloves will be a sufficient defence for the hands; but these must be long enough to cover the sleeves of the coat, so that no Bee can get up the arms. To which let us add, thick yarn stockings over another common pair. A man thus armed is able to encounter the greatest army the Bees can bring against him. If women intermeddle with Bees, it will be proper to defend their
necks

necks and bosoms, by putting on a man's coat, together with the head dress.

75. As this armour is of trifling expence, and will last a life, no person who keeps Bees ought to be without it. With this defence he may turn up their hives, examine, assist, and move them upon any occasion, or at any time, without the least smart or the least danger. Or should Wasps or Bees beset any cattle, with this armour, he may safely go among them, and destroy them.

76. But a small apparatus will do, for any business about the Bees, that does not much disturb them. This may be made of a small hoop, wide enough to extend round the face, and three quarters of an inch deep, with a piece of woollen cloth spread over it, and tacked to its edges, so as to let about an inch of the cloth hang over. A piece of the front must be cut out, and some net-work sewed in as before directed for the hood; a narrow piece will do, placed directly opposite the eyes. A bead, or some such contrivance, should be sewed opposite the mouth part to hold by, in manner of a mask.

77. This will sufficiently defend the face, but especially the eyes. For single Bees, when they are angry, generally aim at them, and at that time, will sting no where else. Persons accustomed to the language of Bees, know what tones they use when they are determined to sting. The war-whoop is then sounded, that every one may stand upon the
D defence.

defence. It is much easier to prevent an evil than to cure it.

78. Among poor cottagers, who keep Bees, one or two of these safe-guards or armour in a village or neighbourhood will be sufficient for the whole, by lending them to each other.

CHAPTER IV.

Of the APIARY, or Place to keep Bees in.

79. **T**HE next object of consideration to a person intending to keep Bees, is a proper situation for his Apiary. The situation of it, whether yard or garden, should be as open as possible to the south; that the fronts of the hives may have as much of the sun as possible. But if the hives cannot be set full south, south-west is more eligible than south-east; and this last is better than north or east. From repeated observations it has been found, that the more sun the Bees have the more vigorous they are, and that they work with the greater ardour.

80. Let them be placed so near the dwelling house as to be in view of the room

room most occupied. Any disturbance or accident, will then be the more readily perceived. Neither will there be a constant necessity to employ a person on purpose to watch the rising of the Swarms, but only as occasion may require. Besides these advantages, the Bees will be familiarized to the sight of the family, and thereby become more tame and tractable.

81. The Apiary should be defended from the northern and eastern winds, either by buildings, walls, or by close and high hedges; these winds are prejudicial to the Bees in many respects. The best hedge for this purpose is the quick or white thorn, permitted to grow high, after being first plashed and intermixed with female lime trees, as the flowers of these as well as of the quick furnish subsistence for the Bees. It must also be so strongly fenced round that no cattle or poultry can approach the Stocks. The first, by throwing them down, will endanger their own lives, and occasion the loss of the Stocks. And the dung of the others, and their roosting upon the hives will prove so disgusting to the Bees, as to make them sometimes relinquish their hives; but at best they will not thrive so well.

82. Neither must they stand under the dripping or shade of trees especially of yews, elders, or laurels. Nor should any weeds or filthiness be suffered near the hives, as harbouring numberless vermin, and other enemies to these industrious and cleanly insects.

sects. An Apiary should not be near rivers, ponds, or large tubs of water, as many of the Bees will be blown therein and drowned.

83. The quantity of ground to be allotted for the Apiary, must be in proportion to the number of Stocks intended to be kept. Houses will be necessary if boxes are to be used. But these are too expensive for general use, or where numerous Stocks are to be kept: straw hives therefore in these cases, are preferable, being much cheaper, as they will answer the purpose as well, and require neither cot nor house.

84. From long experience, it is strongly recommended to set the Stocks at some distance apart, and upon separate stands. By this precaution much quarreling, and sometimes slaughter, will be prevented, as they will be less liable to mistake their habitations on any critical occasion, which may oblige them to return from the fields with great precipitation.

Another advantage arising from this disposition is, that by being separate they are not near so quarrelsome with each other, or with the Apiator. And not only this; but he can also go more safely and conveniently *behind* them, for which there is often an absolute necessity, without giving or receiving any offence.

85. But though the hives are to be placed separate from each other, it is by no means meant, that some should be in one spot of ground and some in another. No; they must

must be altogether in one view, that in the swarming season, the Bee-herd, or person who watches them, may readily distinguish any Swarm that shall arise, otherwise some will be inevitably lost.

86. The country people generally place their Bee Stocks in cots or little hovels, upon shelves one above another, and against walls or pales, without any opening behind. So that the getting at them is like storming a lion's den. And to add to the absurdity, the shelves are so near to each other, that a hive cannot be raised, be the necessity ever so great. These cots are likewise an enticing shelter for numberless vermin, who imperceptibly plunder and destroy the Stocks; and the fault is laid to witchcraft, bad luck, and other mystical causes (241.). Another great fault is the suffering rank weeds to grow about the stands; and being so negligent as not to keep the floor and stands clean brushed.

87. The form of the stands for straw hives should be triangular (fig. 12.). Let three strong stakes of sound wood, of about two feet in length, be drove into the ground, conformable to that figure, so that from the outside of each stake there be fourteen inches distance, and the stakes are to stand sixteen inches above the ground. The tops of the stakes must be on a level with each other, or rather the front stakes should be half an inch lower, so that when the hive is set on, the dripping of rain may pass freely off, and

not run into the entrance of the hive. Flat pieces of wood are to be nailed across the top of the stakes, so that the floors of the hives may stand firm; but the floors are not to be nailed on, for reasons hereafter given, (490). Were the stands made higher, the hives would be more liable to be injured by high winds, or in case of being thrown down by accident, of receiving greater damage by the fall; and not only so, but at this height they are more conveniently managed.

88. The stands ought to be five feet, but at least four, every way from each other, and set in regular or uniform rows; where the ground will conveniently admit of it, seven or eight feet distance between each hive will be still more eligible; but when placed at a smaller distance than four feet, there is no possibility of going among the rows to handle the hives without affronting the Bees of those behind; and they are a people of too great consequence to be unnecessarily affronted.

89. Some gentlemen may, perhaps, disapprove of straw hives in their gardens, as being unsightly; but, if the triangular supporters be made handsome, and the hives themselves be concealed by a wooden case, or only front and sides formed of painted pannels, or by any other smart and pleasing contrivance, that objection will be obviated. And if the stands be placed at any considerable distance from the walks, there will never be any danger of the Bees stinging the company, provided they
do

do not incautiously approach too near the hives. Or a hedge may soon be formed round the Apiary, of syringoes, so as to intercept the view. But this hedge must be placed at such a distance from the front of the hives as not to keep the sun from them.

90. The bottoms of floors for the hives (fig. 6.) should be of well seasoned yellow deal, at least an inch thick, but an inch and an half will bear the weather better, and is not so liable to warp. The shape of the floor is to be round, or at least a square with the corners rounded off; its diameter fourteen inches. Where boards of a due width cannot be readily procured, two pieces glued, tenanted, or rabbited together, may suffice. But to all floors two slips of wood must be nailed underneath, to prevent the wood from casting: this precaution must not be neglected, it being of much consequence towards the preservation of the Bees. And therefore, should any crevices, seams, or fissures afterwards appear, they must be timely stopped up with putty or some other cement.

91. The upper parts of the floors must be planed smooth and even, so that when the hive is set on there may be no vacancy between the edge and the floor. But if the floor be planed a little shelving, or level, within half an inch of the edge, it will prevent the water from standing or running under the edges of the hive.

92. A small slip of wood, about five inches long and two broad, (fig. 8.) will be

required as an alighting-board for the Bees to pitch on when they return from the fields. It may be sufficiently fastened on by means of two pegs of wood, or pieces of thick wire, driven into its edge, and then fixed in the proper corresponding holes made in the front edge of the floor; the joining will not be so close as to prevent the rain from dropping between, and will thereby secure the board from any settled moisture that may prejudice the Bees. If the alighting-board be made out of the solid wood of the floor, many inches must necessarily and needlessly be cut to waste; whereas any small piece of refuse wood of the above dimensions will in fact do better, and be a considerable saving in a number of hives.

93. As threatening storms frequently precipitate the return of the Bees so much as to occasion their mistaking their own hives, and thereby bring on quarrels and battles, it will be worth while, in order to prevent this, to paint each alighting-board of different colours, by which the hives will be more easily distinguished from each other by the Bees before they pitch. And the paint will prove both preservative and ornamental.

CHAPTER

CHAPTER V.

Of the BEE-HOUSE.

94. **T**HOSE who are desirous of satisfying the laudable curiosity of minutely observing the operations of these wonderful insects, must be provided with proper boxes; as such indeed are indispensably necessary for *this* purpose. A *house* also will be equally useful to preserve both boxes and Bees from the *extremes* of the different seasons.

95. A house capable of containing *four* Stocks, will be fully sufficient to gratify the most inquisitive mind in every thing relative to Bees. For real utility, straw hives of a proper construction, which answer the purpose full as well, and require no house, are also much cheaper, and may be as easily and *full* as profitably managed, as boxes of any kind whatever.

96. Directions for the construction of a house to contain four Stocks in the story method: The front to face the south. The length eight feet four inches. Height in front five feet. Behind five feet six inches. Breadth one foot two inches. Floor, two feet from the ground. Three stiles, each four inches wide, and long enough to extend from the roof to the bottom.

Four

Four doors, each one foot ten inches in width, and of the same length as the stiles, to which they are to be hung by hinges, one door to the right hand stile, and another to the left, in manner of folding doors, shutting in a rabbet.

Openings or passages for the Bees, are to be cut out of the front, beginning at six inches distance from each stile, and are to be in length four inches, and one inch and a half high from the floor. These are intended to correspond with the like openings in the boxes. There are to be similar door-ways ten inches and a half in height from the floor. But this height supposes the bars of the boxes three quarters of an inch thick, and the loose floors of the boxes the same.

97. The boxes are designed to stand within six inches of each end; and between every two boxes, is to be a vacancy of sixteen inches; but betwixt the boxes that stand on each side of the middle stile, there will be only eight inches. The boxes are twelve inches wide; so that there will be two boxes, and a space between them of sixteen inches, opposite each pair of folding doors. If a house is to be made for a larger number of boxes, the same model and proportions are to be observed throughout.

98. The floor is to be laid one foot ten inches distant from the ground. It should be upon a level, that the boxes may stand firm, but the boards need not be planed,
if

if loose bottoms be used to the hives, as I have recommended (90.) otherwise the house floor must be made very smooth, and no joinings or seams, unless strongly glewed or cemented in those parts where the boxes are to stand. The floors should be well supported by very strong rails; as sometimes the weight will be very considerable.

99. The four corner posts should be strong and of good sound wood (oak will be best) and well fixed in the ground.

100. The front must be boarded quite close: but it must be particularly observed that within side it must be quite even and flush from end to end. Feather-edge boarding therefore in this part, cannot be admitted, but the boards should be rabbeted into each other, to prevent storms of rain or snow from driving thro' the joinings. The reason for having the front inside perfectly even, is because the boxes are to stand so close against it, that a Bee cannot pass between the box and the front, and thereby get into the house, and also because it is necessary these boxes should sometimes be moved to the right or left, as well as at other times one upon another.

101. The roof may be covered with feather-edged boards, or any other materials that will keep out the wet. The dropping of which is intended to be in the front, and where it will be no inconvenience to the Bees, if the roof be made so as to project two inches beyond the face of the house;
but

but if the dropping be on the back, it will be very inconvenient to the Apiator in many of his operations behind. The two ends are to be intirely closed with boards. And alighting-boards are to be fixed in the front to every passage or door-way, exactly in the same manner as directed for the straw hives (92.).

102. The house should be well painted; for this will not only be ornamental, but, by preserving the wood-work, be a considerable saving in the end. Different colours should also be painted over the several passages; which will be a very good index to the Bees, and keep them from mistaking their respective habitations. It will likewise be very useful to paint the number of every Stock over the door-way.

103. How greatly soever, I may think the story method preferable, there may be persons of a different opinion, and who may therefore choose the collateral method; viz. that in which the boxes are placed side by side. To meet therefore their wishes, we have thought proper to give the following description; and hope it will be acceptable.

104. A collateral house of four Stocks, must be in length six feet. Height in the fore front six feet; back front six feet six inches; breadth one foot two inches. Three stiles, each four inches wide.

Two doors; one to each pair of boxes, and each door two feet six inches wide.

The house to have two floors.

Bottom

Bottom floor, two feet high from the ground.

Upper floor, two feet above that.

105. The door-ways or passages are to begin seven inches from each stile; each passage to be four inches in length and one inch and an half high. But as each pair of boxes are to stand close together, or side by side, the door-ways of each pair of boxes will be nearer together than in the story-house; and similar passages are to be made for the upper floor; for two Stocks are intended to stand on the bottom, and two on the upper floor.

106. No doubt there will be a desire of setting glasses on the tops of these boxes in a similar manner to those of the story method. For this reason it is, that a foot in height is left in each story above the boxes for that purpose. But if there be no intention of using glasses, the houses may be made 16 inches lower.

107. Let it be observed, that this house, and that before described, are formed upon a scale adapted to the size of my boxes. But where larger boxes are intended, the house must be made in proportion to the size. Gentlemen of fortune may have these houses built in a very handsome manner, and ornamented according to their own taste; but great care must be taken not to alter or depart from the scale of dimensions.

108. The spaces left between each pair of boxes are for their more commodious removal,

removal, especially for the story boxes; for when these are to be raised or separated, unless there be a sufficient vacancy to set a spare box between, the Stock must be removed out of the house upon a stool, and then put in again, which prolongs the operation needlessly, and renders it more troublesome to the Apiator as well as to the Bees. However, such as may think sixteen inches between every other pair of boxes, a needless and too expensive a lengthening of the house, may so contract the scale or plan, as to leave only six inches between each; so much room is absolutely necessary to put the arms between the boxes whenever they are to be lifted up or shifted.

CHAPTER VI.

Of BEE-BOXES, or Box-HIVES.

109. **W**E now proceed to the construction of the boxes, (fig. 7.) which, from a great variety of frequently repeated experiments, I have found in every respect to be the most simple in their contrivance, the most easy to manage, the most profitable in their produce, and the most moderate

moderate in price of any hitherto offered to the public attention; at the same time they are equal, if not superior, to any others, for the amusement and improvement of the inquisitive.

110. These are to be made of well seasoned yellow deal, or any other thoroughly seasoned wood, that which is the least apt to warp or split, and has likewise the fewest knots, is the best for the purpose. Each board must be at least three quarters of an inch thick after having been well planed. Thinner boards will not keep the Bees warm enough in the winter, and will therefore endanger their lives.

111. They are to be in the inside full nine inches high, and eleven square, from side to side. Therefore allowance must be made in the height to receive three bars of wood, (fig. 7.) of the same thickness as that of the box; these bars are to extend from the front to the back; the middle bar, (fig. 9.) is to be three inches and a half wide, and the right and left bars only three inches. These bars are to be let into the top, so as to have four intervals, or openings, *a, a, a, a*, of half an inch between each bar, as well as between the two sides of the box.

112. There must be parallel grooves in the edges of every bar, and in the two sides of the box; these grooves must be one-sixteenth of an inch deep, and one-twelfth of an inch wide, in which iron sliders are proposed to run. To admit which, in the back
of

of the box, the ends of the bars are to be *let in* flush with the grooves, while the upper ends are to be *rabbeted*, so as to be even with the upper part of the grooves; a thin fillet (*a. fig. 9.*) is then braided upon the rabbets, which by this management will form four slits or openings, (*fig. b, b, b, b,*) of the same depth as the grooves, and in width three quarters of an inch, in order to receive four sliders, (*fig. 10.*) nearly of those dimensions.

113. But it must be *noted* that the bars are *not* to be nailed down to the box, they being intended to be moveable at pleasure. The *greatest exactness* is required in their dimensions and construction, or the whole of their design will be rendered useless, and thereby bring the scheme into discredit, though the fault will in reality be in the bungling carpenter. Few among the country carpenters (especially journeymen) have tools proper for the work.

114. For the grooves should be made perfectly smooth within side, and of the exact width and depth, therefore cannot be executed by a tenant or common saw, and the usual ploughing irons are too large. If the grooves are made rough or uneven, the sliders cannot run in them with the requisite ease. Or, which is equally inconvenient, if too wide or too deep, they will cause the sliders to run irregularly, and tempt the Bees to fill them so full of wax or propolis, as to prevent the entrance of the sliders without

without great force, thereby greatly disturbing the Bees, and running a great risque of spoiling the operation. After the fillets are fitted on, they must be sawed through by a very fine saw between each bar, so that the bars may be taken out *separately*.

115. As the principal intention of the box-hive is to view the Bees at work, and the manner of their performing their operations, there must be an opening cut in the back to receive a pane of glass five, six, or seven inches square, as may be thought convenient; but in general, it will be more eligible to have the glass the entire length of the back, and but two inches and a half wide; the upper edge of the glass to be within four inches of the top of the box. But where a more extensive inspection is desired, the two sides and the back of the box must be framed, (as for a sash window) to receive as large panes of glass as possible, consistent with the required strength of the box. A greater depth is required in the upper part of the back frame than the rest, the more securely to let in the ends of the bars. There must be also three shutters, to shut close over the windows, to preserve the hive warm in winter, and to prevent the light from withdrawing the attention of the Bees from their work. Boxes with only one pane of glass, are also to have shutters, (fig. 7. D.) either with hinges or to slide in rabbets, both ways, to right or left; or two small shutters to turn upon screws in their tops, and dividing to

E

right

right and left; they should meet in a rabbet, and be fastened by a button at bottom.

116. In the front edges of the boxes, an opening or door-way must be cut out, four inches long, and three-eighths of an inch deep. This *depth* is fully sufficient for the passage of the Bees, and if made deeper or higher, becomes capable of admitting mice and other vermin, to the great prejudice of the Bees.

117. Besides the bars to which the Bees will fasten their combs, a top or cover must be provided of the same thickness as the box, to extend about half an inch over the edges, except in the front, where it must be exactly flush, because the box must stand quite close to the front of the house. The cover is to be screwed down, not nailed; it would be very convenient, if the screws had a ring or a head, projecting flat, that they might be taken out by the finger and thumb; but as none such are kept in the shops of a size small enough, and to be made on purpose may be thought too dear, therefore the common round-headed screws, beat as flat as you can with a hammer, may be easily taken out or in by a pair of pliers or pincers. The screws should always be greased before they are put in, or they will rust, and then cannot be easily withdrawn.

The holes to receive the screws had better be made always in the same places of every box, four in each cover, two in the right hand edge, and two in the left, and one inch and

and a half from the front and back; by these means, the screws of the boxes will indiscriminately suit each other, without breaking the edges of the boxes with fresh holes.

118. One cover serves for each pair of boxes, as does a moveable floor of the same dimensions of the cover; one edge of which must be planed true, that it may come quite close to the Bee-house. If boards of the above width cannot easily be procured, narrower may be rabbeted or tenanted together, and slips of wood let in at the ends of the floors, to prevent their casting; but the covers may have slips nailed across. Any crevices or chasms left in the bottom, will harbour earwigs and other vermin, and thus occasion, not unfrequently, the destruction of the Stock.

119. Another important nicety in the formation of the box-hives is, that the edges, both at top and bottom, be made so true, that any one box may be set over or under another, and no chasm left between, to admit either an earwig or a moth, but stand firm and level; for they will be wanted to stand one upon another promiscuously.

120. It has been observed before, that some persons may prefer the collateral arrangement. Boxes for this purpose are to be made of the same dimensions as the foregoing: They are unlike only in this, that instead of the bars being on the top of the box, these are to be on the side, viz. on the right hand side of one box, and

on the left of the other; that when the boxes are placed together, the barred sides may tally and meet so exactly, that no vermin may get between, as before observed of the story boxes. But as these boxes are but nine inches high, the bars must be made conformable to that proportion, viz. two of three inches and a quarter, and one at bottom of one inch, leaving *three* openings of communication each half an inch wide.

121. The top board is to be nailed fast down, and must be the exact square of the box, for it must have a groove on the same side as the bars, and similar thereto, to receive the edge of the upper slider. As these bars are *not* to be taken out, they must be braded in fast, to strengthen the box. The barred side must have a cover to screw on when the boxes are separated. But like the story boxes, one cover will be sufficient for a pair of boxes, as it will never be necessary for both to be covered at the same time. Each box must have a moveable bottom, something wider than the boxes, but the edges must be square and even, that they may form a close joining, and also may set quite close to the front of the Bee-house.

122. As there are no openings in the tops of these collateral boxes, which might admit glassess, when such are desired, circular holes may be made of half an inch in diameter, (*by a centre or spoon bit*) in number according to the magnitude and number of the glassess to be set on. These holes may
be

be covered, when not wanted, by buttons properly adapted to them.

(123.) Many contrivances have been formed to obviate the great inconvenience and danger attending the separation of boxes in the usual way. I shall just mention here some contrivances that may greatly facilitate this operation. A more perfect method will be shewn hereafter (605).

124. In order to prevent the Bees flying out upon the Apiator when he takes off a box, a frame (fig. 11.) may be made with bars, grooves, &c. of the same dimensions, and similar to the top of the box, (111, and seq.). But it is necessary to observe, that all the sides of the frame must be of the same thickness as the edge of the box.

125. Another method is, to have a groove in each side of the box, and as near the bottom as conveniently can be made; and in the back a corresponding slit from side to side, to admit a sheet or plate of *double tin*, which is to be shoved in when hives are to be separated.

126. Thirdly, If the boxes are made with a three inch and a half bar in the middle of the bottoms, two saws, five or six inches broad, shoved in judiciously at the sides of the box, will separate them without receiving any considerable annoyance from the Bees. The front end of the bar must spread out above four inches, and be levelled down to a feather edge at the door way, to admit the Bees.

127. The first method may be objected to as being too expensive. The second will damage the Bees; as the slider cannot pass close to the under hive, and must cut through all the combs, which are generally extended and fixed to the under hive.

128. The third scheme is the most eligible, as there are few persons but what either have or may readily borrow saws fit for the purpose. And any refuse bits of wood, of the proper dimensions, may be tacked in with little or no trouble or expence. I mean of such of the common people as have any economy or ingenuity: as to the idle and dissolute, it is a pity they should ever have any Bees.

129. The improved method I am emulous to introduce, is by the use of sliders (fig. 10.) of a peculiar construction, on which the whole success of the management depends.

130. They are to be four in number, and formed of milled iron; they should be one-twelfth of an inch thick, fourteen inches long, but not *quite* half an inch wide (*c*,) except within an inch of the end (*b*,) which must be five-eighths wide, and terminating in a circular concave form (*a*,) the concavity of which is to be no more than one-eighth deep. The ends of the openings in the wooden tops are to be indented, conformable to that figure, to admit the sliders so close at the ends that no Bee can escape.

The

The ends of the sliders are thus constructed, that in entering the grooves, they may cut and throw out the wax and propolis, with which the Bees generally close up the grooves (as they do all crevices in their hives) as they are thrust in, which otherwise would bind the sliders and prevent their introduction, at least not without great difficulty. Besides, in order the better to facilitate their passage, only an inch at the ends is left wide enough to extend into the grooves; for was the whole length of the slider to run therein, the friction would be very considerably increased.

131. These considerations are of importance; for by this contrivance we give the Bees so little disturbance in their introduction, that a child may perform the operation without danger. Whereas, in the forcible method of prior contrivances, the Bees are greatly distressed, as well as the Apiator; nor can *many* hives be managed in a day: the uproar becoming too great, alarming, and dangerous.

132. It will be proper, and indeed necessary, for such as have a great number of Stocks, to have eight iron sliders; as such a number will, in many cases, prove very convenient, and greatly expedite the operations.

133. Should the hives be shewn to the smith, before he makes the sliders, it may perhaps give him a better idea of what he is to do, especially if he has any ingenuity; which indeed I have not always found to be

the case with these swarthy gentlemen, any more than with the carpenters.

134. If in any very fortunate situation my box hives should be found too small, they may be enlarged an inch or more in height, and an inch or more in length and width, the bars being made wider and longer in proportion. But it will not be advisable to increase the number of bars: as four openings will be fully sufficient, while a greater number will unnecessarily augment the trouble and expence.

135. The boxes with large panes of glass in the back and sides, are chiefly designed to be placed in chambers and parlours, in order to be more immediately and constantly under the inspection of the proprietor; for this purpose, a shelf of the due proportion is to be fastened in the window and a proper opening cut in the edge of the sash for the passage of the Bees to and fro. Great care must be taken that the door-way of the box fits close to the sash, or the Bees will get into the room. If there be window shutters, corresponding openings must be made in them, as servants will often lie in bed longer than the Bees. These boxes should be covered with a warm cloth in winter. They may be made of mahogany where elegance is required. If the windows be at times opened, the Bees will come in and be very troublesome, which renders the introduction of boxes, rather inconvenient in such places; some out-buildings will therefore be more eligible.

CHAPTER VII.

Of STRAW HIVES.

136. **O**F all such hives as are to stand unsheltered by a house, those made of straw are much to be preferred; as best defending the Bees both from excessive heat, and excessive cold.

137. Where straw hives are not to be procured easily, rushes seem to be the best substitute, but they must be gathered when mature, and be well dried. In some countries wicker, or basket hives, plaistered over with clay, cow dung, or the like are used. But these are neither so cleanly, so comfortable, nor so easily managed as the straw hives.

138. Trunks of hollow trees, cut into the proper dimensions, made smooth and clean within side, furnished with bottoms and tops properly adapted to them, and painted on the outside, will make good and very durable hives, and are much preferable to those of wicker or basket.

139. However, as straw hives are the best, and in general very easily procurable, we will confine ourselves to them. These are to be made of unthreshed rye straw, if it can be procured so, for threshed straw being very much broken and shivered, occasions the hives
to

to be very rough and troublesome to the Bees at their first entrance. Therefore the number of hives wanted should be bespoke before harvest, that the maker may have an opportunity of procuring proper straw for the purpose. Twice the number of hives to that of Stocks should be in readiness, or there will not be a sufficiency for Swarms, and for additional hives to your old Stocks.

140. The sizes of hives vary in different counties, containing from half a bushel, or or less, to a bushel. The most convenient size, as I have found upon many repeated trials, is that of *half a bushel*. Perhaps this will suit all situations, except the heath countries; in those, indeed, when only one hive is intended for a Stock, a bushel will not be too big.

141. It is probable, that should the dimensions I recommend be generally adopted, the hive makers would find it their interest to conform to that standard; and consequently there would be no difficulty of procuring proper hives throughout the kingdom.

142. The straw hives (fig. 8, *a*) according to my proposed dimensions, are to be clear nine inches high, and twelve inches wide on the inside, exclusive of the straw. They are to be made without tops, and quite upright, so as to resemble a broad hoop.

143. The greatest exertion of the makers skill will consist in their being made exact to the above dimensions, and all so very exactly and equally alike, that every different

ent hive, may be put over or under any other, and set close and level; for which reason all the edges both under and upper, should be made as true as possible, rather broader than any other part, and as flat as can be. But in one of the edges the bryer binding should be left distant three or four inches in length, in order for the straw to be cut away to form a proper door-way.

144. They are to have covers of straw bound together in the same manner as the hives; these are to be quite flat, and broad enough to extend half an inch beyond the edge of the hive on which they are to set close and even. They are to be made separate from the hive, being intended to be put on and taken off at pleasure; one cover only is requisite to every pair of hives, viz. to twelve hives six covers.

145. If the hive-maker should procure a hoop bent to the exact dimensions, or width, it might prove a standard to work the whole by, to the greatest exactness. Should he also, as soon as a hive is made, place a smooth board over it, and jump thereon himself, especially if he be a fat jolly fellow, or put a great weight thereon, it would greatly contribute to make the hive close, and the edges level.

146. These straw hives, besides the straw covers, are to have wooden tops, which are to be formed upon the same idea as those for the box hives, viz. they are to have four openings,

openings, so as to admit four of the same constructed sliders, as those used for the boxes.

These tops (fig. 6.) are to be round, fourteen inches in diameter, and five-eighths of an inch in thickness, when planed. In each there are to be four openings, *a. a. a. a.* the two innermost are to be eleven inches long each, and the two outermost six inches long each, and all the openings exactly half an inch wide. It is to be composed of three pieces of wood each three inches wide, and which we shall call *bars, c. c. c.* and of proper length to form the circle as above described, together with two smaller circular pieces, *e. e.* to fill up the whole. These bars are to be joined together and the ends, (*f. f. f. f. f. f. f. f.*) by intermediate pieces of the same thickness as the bars, and wide enough to be rabbetted about a quarter of an inch into each bar, so that when glued in, the openings may be left precisely half an inch wide, and of the lengths as above specified. If the joining pieces are not rabbetted, as soon as the bars, by the heat of the sun and of the Bees, become perfectly dry, they will separate, and the whole frame become loose and unconnected. The whole being glued together, nail a piece of board across, to prevent any disunion. But, *previous to the joining*, there is a very essential operation to be performed to the greatest nicety, viz. *grooves* which are to be made in

in the *edges* of every bar one-sixteenth of an inch deep, and one-twelfth of an inch wide, capable of receiving with ease the iron sliders before described (130); therefore, if the grooves are not made very accurate, the whole will be rendered useless.

147. As soon as the glue of the work is thoroughly hardened, two slips of milled iron, (fig. 6.) something thicker than double tin, and as wide as the bars are thick, are to be *drawn nearly round the whole edge*, as far as is dotted, and nailed firmly on.

148. This will bind the whole more firmly together than if hooped all round; but slits must be cut out opposite four of the openings, at one end, of a length, (fig. 6, *e. e. e. e.*) just sufficient to admit the sliders, and no wider than necessary; for if too wide, the Bees will have a passage out to annoy the Operator. By painting the edges of these wooden tops, they may be preserved for ages, especially if carefully kept in a dry place when not in use. It is not every common carpenter, however, that has either ingenuity or tools to make them with sufficient nicety, but they may be very exactly and *easily* made by one that is master of his profession.

149. It must be carefully noted, that when any of these tops are fixed on, that part which has the slits in the edge for the sliders to enter, must be always fixed at the *back* part of the hive.

150. But

150. But a cheaper method of making them, is to nail the bars together with two small side pieces, properly grooved in a hoop made of the same depth as the bars, and slit afterwards sawed out, for the entrance of the sliders. The ends, however, of the openings in the front must be contracted about an inch by pieces of wood glued in, the inward parts being made rounding, the better to receive the ends of the sliders, so as to come close. But the ends where the sliders enter, are only to be stopped up, leaving the grooves open, otherwise the sliders cannot enter at all. If the ends are not thus managed, the Bees will escape underneath, and the cold and the vermin will have too free an admission; pieces of cork glued in will answer the purpose.

151. These tops as well as the preceding, when placed upon the hives, must have long brads, or wooden pegs, passed through each end of the middle bar, so as to penetrate about an inch into the edge of the straw, in order to keep the top steady from slipping either one way or the other.

152. Those who do not choose to have any box hives, may have a pane of glass fixed in the back of a straw hive; this is to be done by cutting four or five rounds of straw in depth, and about four or five inches in length, fixing the glass in at the ends of the straw, and stopping the joinings with putty. A cover of wood must be placed before it.

153. Those

153. Those also who cannot well afford these kind of tops, need not be discouraged. The meanest cottager may easily make tops himself; unless he had rather idly sleep away that time in the chimney corner, during the long winter evenings, which he might employ in so pleasing and beneficial a purpose. For a *trifle* he may procure refuse pieces of wood of three inches breadth, and fifteen in length; or he might with only a knife furnish himself with such from the branches of a tree; and with the same knife, reduce them to the requisite flatness and smoothness, though his genius be but of the moderate degree. The ends of these sticks or bars must extend sufficiently over the edges of the hive, so as with nails or pegs, to fasten across them bits of wood to hold the bar at half an inch distance, and two small pieces at the sides, pegged down into the edges of the straw; the ends of the openings to be filled up with wood or cork, clay, or cow dung, even with the inside of the hive.

154. This top will make a very good shift without grooves; and he will find in the sequel several methods, by which he may easily manage with it *without* sliders, (559, 600, 605.)

155. For want of a straw covering, lay upon an even piece of ground or floor small twigs (long enough to cover your hive) of ozers, willows, rushes, or the like; on these plaster clay, cow dung, or lime and sand; then put on another layer of twigs, and

and another of clay, &c. when this is dry it will form a tolerable covering, and if made shelving from the middle to the edges, will throw the water off, and keep the Bees dry.

156. For those who can afford it, large earthen milk or pudding pans laid over their straw hives is the best covering that I know of. The largest sort will extend sufficiently to clear the hive-floors of the water that drops from them. Cracked ones may do if the cracks be well stopped with putty, clay, &c. these may be had very cheap. The usual coverings among the country people are hackels made of straw, gathered to a point at the top, and spreading down all round the hive; these form a tolerable covering; but unless well attended to, are apt, after a while, to admit the rain, and harbour mice (651.).

187. Pans are not liable to these inconveniences, and are more easily removed. Beside which, as our hive floors are not fixed, the pans being heavy, keep the hives so steady, that no common winds will displace them.

CHAPTER VIII.

STRICTURES on Mr. WILDMAN'S, and
other prior constructed HIVES and BOXES;
shewing their Defects and Inconveniences,
with a Comparison between them and those of
my PLAN.

158. **I**T is now much more than a cen-
tury since the first attempt was made
by the means of box hives, to manage Bees
without destroying them. Several ingenious
gentlemen, in succession, have very laudably
endeavoured to improve upon each other.
Among these were, Messrs. Mew, Goddys,
Wolridge, Rudden, Warden, Thorley, White,
and last of all, Mr. Thomas Wildman.

159. However praise-worthy their design,
the public at large has been but little bene-
fited. The expence of box hives and houses
has hitherto, and is always likely, to confine
this improvement to the wealthy, as they are
by no means adapted to common use. War-
den, indeed, foretold this when he wrote,
and facts have verified it to this day; unless
therefore we can introduce a scheme which
may come within the compass of the farmer's
and cottager's abilities and attention, we la-
bour in vain.

160. The

160. The perfection of this art does not consist merely in taking the honey and wax, without destroying those that procured them; it extends also to the doing it with the least possible disturbance and damage to the Bees, with the greatest ease and safety to the Operator, and with the simplest and cheapest apparatus.

161. It will be proper to make a few remarks upon the most noted of those apparatus' which have already been introduced to the public.

We will begin with octagon box hives. Warden and some others have recommended these in preference to every other kind, on a supposition that as they will be warmer for the Bees in the winter, and the brood in the spring, would thereby receive the greater benefit. But if we turn from theory to practice it will be found (at least with me it has) that the Bees and brood thrive as well in square boxes as in round straw-hives, which are much warmer than any box hives whatever.

162. The size of a hive indeed is of consequence, but not so the shape. Large hives are very troublesome to handle. In winter, also there will be too much vacant space in them, whereby the Bees will be too much chilled. In summer, the Swarms will be too late; nor will they be able to fill two such hives in a season, except both that and the situation be uncommonly advantageous.

163. On the contrary, small hives not having sufficient room for a great number, the
the

the Bees are obliged to swarm too soon and in too small a quantity, room being wanted for the continual encrease of the young. Nor are they capacious enough to hold a Stock of Bees sufficiently large to perform the various operations requisite in the spring, nor will they be so well preserved from the winter's cold. For the greater the number the greater the warmth will be, provided the hives be well filled; for on this alone the great benefit depends, and not on the *shape* of the box. Much less does it depend upon the nature of the wood of which the box is made; for it is of no real consequence whether it be of deal, mahogany, or cedar. The Bees are not fanciful enough to stand upon such niceties. Let any gentleman keep two good Stocks of Bees, one in a deal box, and the other in a hive made of any other materials, and he will be convinced that this theory is without any foundation.

164. Prior to Mr. T. Wildman there has been no considerable variation in the construction of boxes, except in Mr. White's; for Rusden, Warder, Thorley, and some others, are of the same sentiment respecting the openings of communication; viz. to have these in the middle of the tops of the hives, about six inches long and four inches broad.

165. This construction has appeared to me very injudicious; nor has Mr. T. Wildman's

narrow bars * appeared less so; as it clashes with the generally received doctrine, *that the Queen Bee chiefly resides in the center of the hive: There she fixes her palace and throne, as being most secure, most warm, and most secret, and which she seldom quits but to deposite her eggs, returning again immediately afterwards to her wonted privacy.* If so her life must be in imminent danger at the time of driving the wooden slider in; for upon any disturbance she generally ascends towards the top, and therefore may be crushed by the slider, which cannot be introduced *gently*, because it will be obstructed by the extension of the combs thro' the openings from the upper to the under part. Nay, even the separation made by a tin slider, will not prevent the honey from running down among the Bees, in the very center of the box; this will likewise besiege the openings, and destroy many of the Bees, nay, not unfrequently, the Queen herself; and thus occasion the ruin of the Stock.

§ 166. These dangers, I have the vanity to think, are obviated by the nature and disposition of my sliders and tops: For the middle bar is three inches and a half wide; so this two combs will be always made, and a space left between for the Queen's residence, over which there being no opening she will be in perfect security from the sliders, which are to run on the sides
of

of the combs. To which may be added, that these sliders can always be introduced by the *band*; whereas the wooden ones must generally be forced in by a hammer or mallet, greatly disturbing and hurting both the combs and the Bees; nor is it likely that the Apiator himself will escape quite free.

167. Another great inconvenience attending these middle openings is, the giving the Bees much unnecessary labour, by making them crawl up the sides, &c. before they can get to them, and many of them are a long while before they can find them out. In Mr. Daniel Wildman's, (nephew to Mr. Thomas Wildman) box hives the communications are near the back. The Queen indeed by this alteration is not in quite so much peril, but it increases the task of the Bees. For these insects usually and through choice ascend by the front of a hive, and the nearest combs; consequently the way is considerably lengthened by their being obliged to go to the back before they can ascend. These are perhaps the principal reasons why Bees in these boxes shew so great a reluctance to begin to work in an upper hive.

168. Let it also be considered, that when an empty hive is set under another, the Bees, heavily laden, must first crawl up its sides to the top, and when there, must search about some time before they can find the opening, and when found, it leads not to the distant combs, where their service is now most

wanted, but to the place already filled and thronged with the Queen and her numerous retinue. And not only so, but this disagreeable task must, perhaps be continued some weeks, before they will be ready to work in a lower hive, or have made combs in its center to ascend by. So that here is a great waste, both of toil and time.

169. Actuated by the desire of discovering a method to remedy these great inconveniences, and to preserve with more ease and certainty the young brood, the Rev. Mr. White paid great attention to this subject. The result of his care and trouble was the ingenious and simple invention of collateral boxes.

Madam Vicat, a no less ingenious lady, of Switzerland, has endeavoured to improve upon him. And a gentleman under the signature of *A Lover of Bees*, in the appendix to Mr. T. Wildman's treatise, has proposed an improvement upon both.

170. Undoubtedly, by having the communications in the sides, the Queen can be in no danger, and was there no other method of obtaining this advantage but the collateral, we should not hesitate to give it the preference.

But by keeping Bees both in story and collateral boxes at the same time, I have constantly found that they will not so readily extend their works lengthways as perpendicularly. Besides, in Mr. White's boxes the openings are not sufficiently numerous

to tempt the Bees that way. And, not only so, his method of sliding a sheet of tin, to separate the boxes, irritates the Bees more, and the Apiator is in greater danger than if he had precipitately forced the boxes asunder without it; as any one upon trial may be feelingly convinced of. Upon the whole, the operation is much more awkward and inconvenient to be performed this way than story method.

171. But the grand point, which these several improvements seem to have more immediately in view, is the better nurture of the brood, which they suppose, with some other authors, are placed in the middle of the hive, and unless so placed will not arrive at maturity.

172. This perhaps is carrying our refinements too far. That the Queen, in general, lays most of her eggs, especially the Drone eggs, in the center of the combs, is true. But if room be wanted, she will lay them in any other parts, even close to the windows, not excepting the royal cells; nor has it been observed that any failed the more on that account. Of the truth of this I have had yearly demonstrations ever since I have kept Bees. Nay, the contrivance itself defeats its principal design, viz. the procuring a greater degree of warmth for the brood. For by adding these side boxes, the Queen is induced to lay her eggs nearest the entrance, consequently the brood must be much more subject to the influence of the

air than if the brood were in a box behind, or in an upper one. The truth is, we much oftener want early honey than early broods; and frequently both the old and young perish in the spring for want of food, and not for want of a warm situation.

173. The *Lover of Bees* proposes, that a suit of three boxes be placed *before* each other, instead of side by side. This does not seem to me to promise more success than the others. For, in the first place, we cannot so conveniently see how they thrive in the middle box. Secondly, when an empty box is placed before another, the Bees must pass with their loads through it, some weeks perhaps before they will have occasion to build therein, or otherwise frequent inspection is required, to see when they want an additional box, or they may want room before it be known that they have need of it; whereas in the collateral and story plan, they may have admittance to either without that inconvenience. Sliders are also to be used in the separation; but as we have neither been favoured with the particulars of this arrangement, nor with any account of his success, we can say nothing very decisive concerning it. This we lament, as the writer seems to be a judicious observer of Bees, and has made some very pertinent remarks upon Wildman.

174. But I find that all these, and several other methods, have been tried by a very ingenious

ingenious gentleman, who published in 1675, under the signature of J. W. Gent. *, and had been then found as inadmissible for general practice as they have since.

To remedy the inconveniences of these methods I contrived mine, which is much less complicated, and much less expensive; requires but little attention and trouble in the management: far less indeed than Madam Vicat's, whose Boxes cannot be separated without the introduction of smoke; (not to say any thing of the expence) which renders the operation still more troublesome and offensive to the Apiator and Bees than any of the other modes before-mentioned.

175. Mr. Thomas Wildman's boxes † are the next that merit our attention. And although he has distinguished himself very eminently in the *Bee-walk*, and enlightened us in some things, yet we must not depend upon him as infallible.

176. His plan consists of a double square box, the lower one to have six bars across, for the Bees to fix their combs on; the upper box instead of bars is to have two frames, and each frame to have four upright sliders. There is a wooden slider to be put in between the upper and lower box, and a similar slider at bottom. There are three windows with shutters to each box.

177. A

* Which I suppose to be Worlidge.

† See his Treatise on the Management of Bees, p. 112.

177. A drawing is given of these boxes and frames, but it is too inaccurate, and his description too defective, to be understood by common understandings. At least, neither myself, nor several of my friends, to whom I have shewn it, were able to comprehend it. However, the purport seems to be, that each of these frames are intended to hold three combs, and when filled are to be drawn up at the top.

178. Something analogous to these are those of his nephew Mr. Daniel Wildman*. But these have three frames in a box, and are to be drawn out at the back. Others I have seen formed with three drawers, to be pulled out like those of a chest.

179. All these are very pretty contrivances in *speculation*. But let me here observe, that when any of the frames, or divisions, are *drawn* out, a whole regiment of Bees will *draw* upon the innovator in defence of their property (48.). The disturbance is great, and their fury still greater. But suppose the Bees can be confined in the frame until that is taken out, the expence of so many frames is needless, because the box itself may be separated, and any combs taken that are proper to be so, and the box afterwards returned.

Besides, the Bees will extend their combs over the joinings of the frames, and if they do

* Complete Guide, &c.

do not fit very close will cement them so firmly with propolis as to render it impracticable to draw them out at all.

180. Neither can I agree with Mr. T. Wildman, that repeated tappings upon the glass will cause the Bees to quit a box; so far from it, they will flock to that place in greater numbers. But suppose the greater part do ascend into the upper box, some will remain, and consequently when the pane of glass is taken out, (as he directs) in order to come at the combs in the lower box, the remaining Bees will certainly revenge the theft: for no tappings upon glass can be strong enough to intimidate the Bees like driving. Then to take the pane of glass out first, and afterwards the combs at the back, must be a very awkward, inconvenient, and also a slovenly method, for much of the honey will be smeared about the box.

181. The same objection that has been made against the frames, holds equally good against the sliders in the middle and bottom of the boxes. For being of wood, and the whole breadth of the box, they will be far more difficult to introduce than any we have yet mentioned.

182. Mr. T. Wildman asserts, (page 156.) "that as there are but three combs in each separate frame, the Queen at any time may be discovered." It does not appear so to me; and most connoisseurs in Bees know, that except at the moment of depositing her eggs,
if

if there be but two combs, the Queen will be in the middle, and so surrounded by her attendant Bees as not to be seen, unless through mere chance, by the best pair of philosophic eyes in the kingdom. If a hive constructed entirely of glass (as a globe) will not present us with an opportunity of beholding her Majesty, much less can we expect it from so partial an opening as that of a side or back window.

183. But the grand object principally intended by his plan, and that of several others, is the taking the honey frequently; as being then, say they, much superior in goodness than it would be if left till the end of the season. Conformable to this design is the construction of Mr. T. Wildman's straw hives as well as of his boxes, consequently the same strictures will so far apply to both.

184. That honey taken in the summer is better than what is taken in autumn is by no means so clear a point. Because, as soon as cells are filled with honey, they are sealed up with wax; which is full as effectual to preserve the spirit and fragrance of the honey, as the best glass phials, even though they have ground glass stoppers. If honey be deposited in virgin cells it will suffer no diminution of its goodness, nor alteration in its colour, however long it may be kept there; but if laid up in old cells, it will in a very few days become darker coloured.

185. I acknowledge, that honey taken at the time when the most aromatic flowers are in bloom, is preferable to any other; but then this may be done, and best done too, by glasses, or other small vessels placed upon the tops of the boxes or hives (431, 452, 462.) without any additional expence, and with very little trouble. In other respects, one of my hives or boxes, taken when full, will have honey and wax equal in quality to any from his shallow hives.

186. Besides, there will often be brood in the shallow hives when taken off, nor will they yield so much virgin honey as might be supposed. I tried Mr. T. Wildman's shallow hives three successive years, but they afforded me not near the profit I gained from those Stocks of the same years which were managed in my own way.

187. Mr. T. Wildman has introduced into his practice tops for his straw hives with circular holes; these I am apt to think are rather disagreeable to the Bees, as they oblige them to build their combs out of the usual stile of parallel lines, and to vary them, in many curved directions, according as the holes interfere. If holes are thought most proper, they should be made in double rows as near as possible to each other, and in straight lines, leaving proper vacancies between every double row, for the combs to be fixed to.

188. It will not, I hope, be thought impertinent if I here make a slight digression,
for

for the sake of observing, that when such Swarms as came from the Stocks of these hives that had tops with holes in them, were put into hives with bars, they nevertheless made their combs some curved and some oblique, and this for two years in succession; which evidently proves, that the old Bees go out with the Swarms, and that those young Bees of the second year, which saw the manner of building in the hive they left, pursued the same plan when they formed a part of the next spring Swarm*. It also proves, that the elder Bees are the principal architects.

188. Perhaps it may not be improper to make some further brief remarks upon Mr. T. Wildman's straw hives, and by comparing them with those I propose, some judgment may be formed which is the simplest, easiest, and most beneficial; and from thence inferences may be readily and justly drawn respecting all other kinds of hives and boxes.

189. His straw hives are seven inches high and ten wide; in the upper row of straw a hoop is fastened, and to this are nailed five bars, each one inch and a quarter wide. In one of these hives a Swarm is first to be put, and another placed under it the

next

* From this circumstance a question may arise relating to Instinct, which is supposed to act invariably. For how is it possible that faculty could impel these insects to deviate from a straight line, and to carry on their work in directions suited to their new habitation? Was there no ratiocination employed?

next morning. This next morning's work my hives do not require. But why the morning, when in the next evening it may be done with more ease and safety? Soon after a third hive is to be placed under the two former: but whether at night or in the morning we are left in the dark. At the end of about three weeks, the top hive is to be taken off, at the noon of a fair day (6.11), and a fourth hive is then to be placed under those that are left. After a while another hive is to be taken off and a fifth added, observing that the first hive taken off, is to be reserved, lest it be wanted to be replaced again in the winter.

100. To persons who have nothing else to do but tend Bees, like Mr. Wildman, these repetitions of taking off and putting on, may be a very pretty amusement. Provided, however, that the Bees be like the common flies, that is, without stings. For most assuredly, the combs of these shallow hives will be so extended and fixed down to the bars of those underneath, that in taking one off (the manner of doing which however we are not made acquainted with) force must necessarily be used to disengage the combs, part of which breaking, clumps of them will be left upon the bars of the under one, and prevent a cover being placed on, until they be removed; during which time, the Bees of the hive taken, and of those left, having free egress and regress, will soon make the Apiator heartily sick

sick of his operation, and Mr. Wildman's invention.

191. But seriously, can it be thought, that farmers and cottagers will or can spare the time and attention that this method requires, or indeed that the profit, especially in counties considerably distant from the metropolis, will answer the expence and trouble. Moreover, the disturbing the Bees so much, together with the shaking of the combs, and perhaps causing some to fall out (being done in the heat of summer) so intimidates and disheartens the Bees, that they seldom work with their wonted vigour and alacrity the whole season after.

192. My proposal is to have only two hives to a Stock. Fewer can by no means be dispensed with upon any plan to preserve the Bees. These require but one removal. By means of the sliders, the Bees of the hive left are always confined during the operation; and where an additional frame is used, those of that taken off will be kept in also. But if this be thought too expensive; several methods are pointed out in the following sections (592, 599, 600, 602, 605.) of doing it with security, and with little or no apparatus. And the time of adding or taking a hive will require no other inspection than the casual one of the Apiator, or servants of the family as they pass the Apiary *.

193. Mr.

* I would just observe here, that the combs of that hive which Mr. Wildman directs to be taken off in order

193. Mr. Wildman further observes, "that the Queen will lay some eggs in the upper hive, but so soon as the lower hive is filled with combs, she will lay most of them in it. In little more than three weeks, all the eggs laid in the upper hive will be turned into Bees." Very often it will be so, but as often the contrary. I have taken not only his shallow hives, but also common round top hives, that had been raised three *months*, and yet when taken were as full of brood as though no under hives had been placed (106, 193, 472). Which proves this theory fallacious. There is no certainty in any of these methods of not having brood in additional hives, placed either by the side or underneath. The only sure way may be seen (473).

194. The inconveniences of narrow bars I have already taken notice of (196) as being much worse than where the openings are only in the middle. Straw hives have been formed upon that principle both here and in France, and smoke used to cause the Bees to ascend into an upper hive. But as we can perform it with more facility and and less offence, (592, 605) it will be unnecessary

order to be replaced in winter or spring, lest the Stock should have short commons, will be liable (however well secured) to become mouldy, and the honey candied; or the moth may get in and destroy the whole.

cessary here to enlarge further upon the impropriety of it.

195. My hives have four openings, in the whole of thirty four inches, which though not equal to Mr. Wildman's barred hives, are yet fully sufficient for the Bees passage, as every comb will have a free passage of communication from it, either upwards or downwards. The communications of my boxes are also forty-four inches in length; whereas those boxes that have no bars, seldom have more than eighteen inches. So that they have here a superiority of twenty-six inches. But what is still of more advantage, the Bees can crawl up and down the sides and ends of my hives and boxes, without obstruction. And when the combs are built, can descend by them in direct lines to an under hive, as though it were but one hive, and adapted to their own peculiar mode of architecture. Nor is this chimerical: the Bees have often furnished me with demonstrative proofs of the truth of it, either working upwards or downwards as I chose to have them. (473, 492.)

196. My sliders have also the advantage, for, being four in number, and furnished with sharp edges, they are introduced, not like the large wooden sliders, all at once, and with great violence, but gradually and alternately sliding in easily, and with little or no disturbance; especially in boxes set in a house. The Bees will neither know
the

the cause nor the invader. This operation therefore does not require even so much as a pair of gloves to perform it in. Neither ought we to forget the advantages arising from the security of the Queen; of which we before observed (165, 166,) the very great importance.

197. By means of these sliders, glasses may be set equally as well on the straw hives as on the boxes (452) without any sort of danger or difficulty. My straw hive tops have also a great superiority over all others, of allowing an inspection into the state of the Bees works at the top; for by putting the sliders in at any time, than taking off the cover, and, after placing a slip of glass over either of the communications, withdrawing the slider, not a Bee can come out, and curiosity may be satisfied without any danger; which will not only be entertaining but, on many occasions, useful.

198. The last point of comparison we propose to examine, is the expence or difference of value of Mr. Wildman's straw hives. Five are required to one Stock; and each hive will cost one shilling, which is five shillings the set. Of mine two only are necessary for one Stock; the expence of which is two shillings. His hives have straw tops; so have mine. But each of his hives has a hoop fastened in it with seven bars, which I will estimate so low as only sixpence each: this is two shillings and sixpence more.

Each grooved top of mine will cost two shillings; which with the hives amount to six shillings for my set; while his set comes to seven shillings and sixpence.

199. But there is still a greater difference in this respect. For his hoop and bars, being fixed, are not applicable to other hives; and as straw hives in two or three years are not fit for service, the whole must be new. My tops, on the contrary, being moveable at pleasure, and suiting each hive indiscriminately, will with care be durable, perhaps for centuries, and therefore ought not to be estimated with the prime cost of the hives; the same may be said of my sliders. The extraordinary expence for each Stock, the first year, will be four shillings for tops, and two shillings and sixpence for sliders.

200. But for every succeeding year, the expence will be but two shillings at most, reckoning a hive for a Swarm, and another to raise the Stock with; and this will frequently be unnecessary, because an additional hive will not often be above three or four months in use before it be taken away, and therefore will be hardly the worse for use; so that upon the whole, it is but a trifling advance more in keeping Bees this way than in the old one of *single hives*. Nay, the expence may be still very considerably lessened to persons that make their own bars without grooves, as directed, (153).

201. But

201. But let us now suppose that only twenty pounds extraordinary of honey and wax be obtained the first year from six Stocks; will it not be a sufficient compensation for the extra expence? Most certainly it will; and therefore the whole apparatus may, the next year, be fairly considered as costing nothing. Nor is this all, for the pleasure of managing the Bees more profitably and with greater ease, may surely be added. All these considerations ought, I think, to have some weight with every prudent and sensible person.

202. As to the price of Mr. Thomas Wildman's boxes, I am not acquainted with it. But as they are more complicated than mine, it is reasonable to suppose, that the expence must be greater in proportion. We may, however, give a shrewd guess at this, from observing the price of his nephew's boxes. In his Treatise, Mr. D. Wildman, though he calls it *complete*, has forgot to give the dimensions either of his hives or boxes; but the last I take to be rather more than a foot square. One of these with four glasses, each containing about half a pint, and one about three times as large in the middle, together with a cover to put over them, comes to two guineas. The wood-work is of mahogany.

203. His straw hives, about sixteen inches diameter, and eight deep, with seven glasses and straw cover, half a guinea. The expence

86 *Strictures on Mr. Wildman's, &c.*

of one of my straw hives, with barred top, and six half pint tumblers, single flint, and one quart tumbler for the middle, will be eight shillings, viz.

Glasses	-	-	5s.
Hive	-	-	1s.
Barred Top	-	-	2s.
			—
			8s.
			—

204. A pair of my boxes, made of painted deal, with moveable top and bottom, will be twelve shillings.

205. A pair with three large panes of glass in the three sides, brass hinges, moveable top and bottom, all of painted deal, one pound four shillings.

206. These are the extreme prices for which any ingenious carpenter will make them. No further comment is here wanted, every one's reflection must readily make it,

CHAPTER

CHAPTER IX.

*RULES and CAUTIONS to be observed in the
Purchasing and Removal of BEES.*

207. **T**HE two seasons most proper for purchasing of Bees are, the spring for Swarms, and the autumn for Stocks. The best swarms usually rise from the middle of May to the middle of June.

208. If a person commences Bee-master, or Apiator, in the spring, he should send his own hives or boxes to the neighbours he intends to purchase of any time before April, that they may be in readiness against the Swarms rise. But there will be danger of imposition unless the bargain be made for a Swarm that will at least measure a peck; and therefore a smaller Swarm ought by no means to be put into the hive.

209. When the hive is furnished, and before it is brought away in the evening, it should be held up and examined whether the cluster of Bees be as bulky as it ought to be, if not, it should be struck out upon a cloth, and another hive set over it (260). In this case, a better Swarm must be patiently waited for; otherwise, the first large Swarm that shall rise, may be bargained for among the neighbours; this should be brought home the same evening, when being displaced from

88 *Rules and Cautions to be observed in*

the hive they are in, the intended hive should be placed over them, and they will soon ascend therein.

210. A small Swarm will not only yield no profit the first season, but if the weather be unfavourable, and the situation bad, it will be very likely to perish before the next summer. A Swarm that will nearly fill one of my straw hives, may be called a very good one, and will turn out sweetly profitable before the autumn comes on. If a large Swarm cannot be procured, two small ones, united in one, (260, 366.) will answer the purpose as well.

211. If the Bees be not brought home the same evening that they swarmed, many of them will return to the place where they stood; and not knowing where to go, will be lost.

And not only so, but if kept two or three days before they are brought home, several combs will be formed, which being new, and consequently very tender and warm, a slight motion will cause them to fall, smothering many of the Bees, perhaps the Queen herself, and thereby occasion the loss of the whole. But if through necessity of any kind, the Swarm be kept so long, two or three o'clock in the morning will be the safest time to bring it away, as then the combs will be the coolest.

212. September or October are the two best months to buy Stocks in. But it will be proper, if you are not conversant in Bees, to
take

take the judgment of some skilful and disinterested neighbour. For it is absolutely necessary that the Stocks should be examined before they are purchased. Perhaps by attending to the following directions you may become a competent judge yourself.

213. For performing this business, a cool day, or a fine calm evening, or rather than either, the break of day, as at this time the power of stinging is weakest, is to be preferred. Windy or rainy weather is improper for this purpose, as it makes the Bees very fretful and quarrelsome. The armour (73) will here be proper, or at least the face should be well secured. Gently turn the hive up upon its edge, high enough to have a full view of the Bees and combs; if there be many Stocks you want to examine, as soon as the Bees become too troublesome, leave them for about half an hour, or until they seem tolerably quiet; and then in like manner proceed with the rest. But the best way will be to use the mesh or grated board, hereafter mentioned (600, 602.)

214. Observe that if the combs, as far as you can see, be of a white colour, or of a slight tinge of yellow, they are the produce of a Swarm of this year; but if of a very deep yellow or brownish colour, the Stock is of the preceding year. When the combs are of a very deep brown, or black, the Stock is certainly an old one, perhaps three or four years old, and totally unfit for
your

your purpose. These require a more closer inspection, as a sudden glance will not discover the truth; for the bottoms and sides of the combs, though apparently new, are often made by old Stocks, while the rest of the combs may be of three or four years standing.

215. The spaces, or streets, (if I may be allowed to call them so) between the combs, should be well crowded with Bees, and the combs themselves well stored with honey, down to the floor, or nearly so. If this is not the case it is a sign it was a Cast, or a Stock too poor to form a thriving Apiary with. A good Stock will weigh from twenty-five to forty pounds; but in old Stocks, the weight cannot be depended upon, (628.) which is another reason against buying such.]

216. It will be more advantageous to purchase a good Stock in autumn, than a Swarm in spring. For there will be little risk of such a Stock's prosperity until the next season, when most probably it will afford a Swarm; so that for the same price, you may be said to have both Swarm and Stock. Whereas, if a Swarm be bought in the spring, there will probably be no advantage until the next year.

217. In the vicinity of London, the price of a Stock or Swarm is usually half a guinea; but in distant counties seldom more than half the money; though some country people are so ridiculously superstitious as to suppose, that Bees will not thrive unless gold be

be paid for them. What absurdities are there, however gross, which the human mind has not adopted at one time or another?

R E M O V I N G.

218. It must be in the dusk of the evening, when all the Bees are at home. But some hours previous, the hive should be raised a little from the floor, by bits of sticks, or tiles, &c. otherwise, when the hive is suddenly taken off, a great number of the Bees will remain on the floor. A cloth that is not of a very close texture, should be laid ready upon the ground before the Stock, then gently lifting up the Stock, set it upon the cloth, and immediately gathering the corners up very tight, tie them together at the top; and lastly, tie a cord round the body of the hive; this will effectually prevent any of the Bees escaping, or crawling up to the top. When brought home, set each hive upon the ground, near the stand it is designed for, untie the cloth, and lifting the hive off, set it upon the stand, and lay the cloth with the Bees on it over the hive; before morning they will go down into the hive, and none be lost. If the hives are to be placed in a Bee-house, they must not be set close to the front, for then the Bees on the cloth cannot have entrance at the doorway;

92 *Rules and Cautions to be observed, &c.*

way ; but the next evening they should be shoved close.

219. As the straw hives in common use project more in the middle than at bottom, consequently when placed in a Bee-house, a vacancy will be left between the hive and the front. This chasm should be filled up by cutting or hollowing out a piece of wood in the middle, so as to be very thin there, and about three inches long, leaving the ends sufficiently thick to fill up the vacancy ; if it does not exactly fit, a little clay, or cow dung, will supply the defect, as it is only to be used at first, until the Bees have worked themselves into a box.

C O N V E Y A N C E.

220. The best way of conveying Swarms or Stocks from one place to another, is in a hand-barrow between two men ; the next to that is by a milk yoke, with a hive on each side, or one or more hives may be hung upon a stout stick, resting upon two men's shoulders. But where many are to be removed, or when they are to be carried several miles, a post chaise, coach, or any other vehicle that has an easy play upon springs, is to be preferred : the hives must be carefully placed upon a thick bed of straw, and the motion of the carriage slow and gentle.

For want of these, a cart may do ; adding the more straw, and taking care that the horses

horses proceed only in their slowest pace; otherwise the combs will probably be mostly shaken down, and the Stocks spoiled.

CHAPTER X.

Observations on the Increase of BEES, and Nature of SWARMS.

221. **T**HE increase of Bees is of very great importance to the owners, for in proportion to *that* will be the profit, and therefore every thing relating to this deserves a minute detail.

222. The breeding of young Bees is begun sooner or later, in proportion to the prolific nature of the Queen, the strength of the Stock, and the state of the weather. The more numerous the Bees are in a hive, the greater the heat, which enables the Queen of such Stocks to begin breeding much sooner than the Queen of those that are poor and weak; the brood of which increase but slowly, and are therefore later. If the weather be mild the Queen will sometimes begin to breed in January, but often in February, except the season has been very cold, and is
very

very backward, and then it will be March first.

223. For a long continuance of cold weather, or of both cold and wet, greatly retards the hatching of the brood, and causes many abortions, which may be seen thrown out of the hives in such unkindly seasons. But when the spring is neither very early nor very late, there will be the greatest brood, and consequently the most numerous Swarms.

224. For as the influence of a mild spring hastens the brood, it no less hastens the blossoms. The fallows, the snow drops, and crocusses, those welcome harbingers of joy and abundance to the Bees, (512.) afford them at this time plenty of farina, without which their young cannot be sustained or fed. But should wet weather set in, while these are in bloom, so as to prevent their going out to collect it, those already bred, will pine for want, and very few will be added to the number until a more propitious change. So that we see there must be a coincidence of weather and flowers to produce timely and large Swarms.

225. It often happens that there is a long season of proper weather for gathering farina, (515.) even to the latter end of May; but too cold for any flowers to afford honey. During this tedious interval, the Bees having nothing else to do, their whole attention will be fixed solely to the increase of their family, not considering that famine will soon begin to stare them in the face.

226. Like

226. Like too many of our own unthinking species, who eagerly seize the bliss of propagation, support the offspring who may! Thus the Bees, having already a large family, and that encreasing daily by hundreds, at the same time that the honey is wholly or nearly exhausted. In this perilous dilemma, they must either starve or lessen their numbers. Irresistible necessity compelling, they divide, and a Swarm rises, which surely dies, if a warm season does not immediately succeed.

227. But if no young Princess be ready to lead a Swarm, the superabundance of Bees will in a short time consume the small remains of honey, and the whole will perish by famine, at a time, and from a cause the least suspected, and often so late as the end of May.

228, May and June are accounted the two best months for Swarms; for those that rise much sooner or later are either too few to form good Swarms, and are in danger of being starved, or by coming too late, impoverish the old Stock by too large a decrease; and themselves not being able to lay in a sufficiency of sustenance for the winter, will run the utmost hazard of dying also. To the middle of July I have had Swarms, and known many others, that have succeeded; but later than this none should be suffered to swarm. The best method of accomplishing this is to raise the Stocks (231).

229. If the spring has been good for breeding

96 *Observations on the Increase of Bees,*

breeding, but no honey gathered until late, as perhaps until the middle of June, however capacious their *bive* may be, the Bees will certainly swarm. This is repugnant to what some writers have taught; trusting to whom I have lost many Swarms, by neglecting to have them watched; and there is no doubt, but many others have done so too, and suffered the same loss. Long and great experience has since fully convinced me of the fallaciousness of this principle.

I have had Bees both in boxes and hives that increased so fast, and seemed so crowded, that to prevent their swarming (as I then thought) they were raised gradually three stories high. But notwithstanding all these precautions, every one of them swarmed, nay some of them cast beside; and in such indifferent weather, that no one could have suspected any Swarms would have risen. One year in particular, though my Bees were so prone to swarm, several of the neighbouring Stocks, being over charged with young, were obliged to lie out for want of room, and did not swarm at all. In this instance we observe, *plenty* of room induced mine to swarm; while others for *want* of room, laid out, and never attempted to swarm.

We may further notice, that in hollow trees, and under the roofs of houses, which afford the Bees unlimited room, yet it is well known that even in these situations they always send out Swarms.

230. On the contrary, when *honey* is to be met with *early*, and in *plenty*, and the Bees have abundant spare room, it is a great chance if they swarm at all; not being willing to leave a house well furnished to go in quest of a new habitation, as here every thing will be wanted. What more confirms me in this opinion is, that in the summer of 1779, a very remarkable one for the production of honey, only two of my Stocks, which I purposely had not raised, swarmed. The rest filled their hives so fast, that I was obliged to raise them twice. While the Stocks of the country people in the neighbourhood, swarmed, and cast several times; nay Swarms produced Swarms; (or as the country people phrase it) had maiden Swarms.

231. This was owing to there being plenty of Drones, and of young Princesses ready to lay; so that their hives being too small to hold them, the honey, and young brood, and their owners not possessing ingenuity enough to assist them, they could do no otherwise than divide. To this cause also it is owing, that Stocks are obliged to swarm and cast so often as to impoverish themselves intirely. Similar observations were made by Butler in the year 1616. Herein the Bees act like parents affectionate to excess, who strip themselves to enrich their offspring, and by that means become exposed in the winter of old age to all the rigours of poverty.

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232. The

232. The more pregnant Princesses there are, the more eager the Bees are to swarm (other favourable circumstances coinciding). On the contrary, if none of *these* are ready, be the quantity of the Bees ever so many, no Swarm will rise, but will rather die than quit the hive. This fact has been fully ascertained by the examination of Stocks, which could by no means whatever be induced to swarm, and were always found with only the old Queen; the royal eggs, or embryos, having failed, or been destroyed by accident.

233. Early Swarms are not always best, viz. from the entrance of April until the middle of May, the weather often changing from one extreme to another; which either starves or otherwise so reduces them, that they become of little worth. But there is no rule without exceptions. For I have known early Swarms which multiplied so much as to produce a maiden Swarm so late as the 30th of July, and prospered. I also knew two old Stocks that produced six Swarms the same season, mostly good. But it was in an excellent season and situation, and no other Stocks near them. Such Stocks with me, instead of thus increasing, would not have survived the winter. Moreover, in such favourable situations, many Swarms have risen about the ninth of May, though very cool weather, with northerly winds, and which continued some weeks. From these circumstances I inferred that they would
not

not be able to procure sustenance. They deceived me however, for they not only lived but proved vigorous and prosperous. Such difference is there in situations!

234. A large early Swarm, with favourable weather succeeding, will be far superior to one that is later; for having so much time before them, they will be well replenished with stout young labourers, ready to reap the honey harvest, the sweet reward of all their toil. The Mother Stock, at the same time, will be in the same thriving condition: the old proverb applying here most admirably, viz. "Many hands make light work." If bad weather, indeed, should supervene they will require a little attendance and expence in feeding; for which their future toils will more than doubly compensate.

235. Butler has given us a judicious standard to judge of the propriety of the time of Swarms rising, viz. "that Swarms before the blowing of *knapweed*, are in good time. Those before the blowing of blackberries may prosper. But blackberry Swarms, especially Casts, will be seldom worth keeping, as being too late to lay in a proper store for the winter. Such should be returned back to the Stock."

236. In another place he observes, "that in some backward years, as was 1621 and 1622, there have been Swarms the latter end of July that prospered. For it is remarkable, the bramble did not blow
H 2 " until

“ until that time, which used to blow a
 “ fortnight sooner.

“ So in warm countries, and a kind spring,
 “ Swarms have come early in May ; whereas
 “ in the heath countries Swarms are as late
 “ as near the end of July, which often prove
 “ better than the early.” Near woods the
 Bees obtaining from the trees plenty of farina
 to feed the brood with, is the reason why
 Stocks, in such situations, have large Swarms,
 and early.

237. The common working Bees are first
 bred, then the Drones and Princesses. In general,
 the Drones do not appear until the middle
 of May, but large Stocks will sometimes have
 them as early as March, in April very common.
 Hives will often be so full of Bees as
 to cluster out before any Drones shew themselves ;
 and, for want of which, they will not swarm ;
 not but there may be a few Drones in the
 hive, though not sufficient in numbers to make
 their appearance : or the air may be too cold
 for them, though not for the Commoners ;
 for the Drones are much tenderer than these.
 When they are most numerous, the Swarms
 are most likely to rise. If this happens early,
 in general so will the Swarm be ; if late,
 the contrary.

238. Butler observes, that sometimes the
 first brood of Drones in the spring will be
 killed, and cast out. I observed a similar
 instance in a Stock, which in the beginning
 of May was full of Bees and Drones, but the
 middle of the month affording plenty of honey,

ney, to make room for it, they not only killed the Drones, but the brood also; hundreds of which lay before the hive.

239. The generality of country people are so ignorant of the nature of the Drones as to imagine they are doing great service in destroying them as soon as they appear; which is full as wise, as if they were to kill *all* the males of their flocks or of their poultry, in order to have the more chickens or lambs. Good dames! if you love your husbands, cherish the Drones, for they cherish the Queen, even as your husbands cherish you!

240. I have experienced, that in a summer, extremely dry, few Princeesses were born, and many of the Queens dying of old age (as I suppose) there were but few Swarms, and many Stocks deserted their hives for want of Queens. Though this was the cause, few perhaps knew it, and therefore other causes were assigned.

241. As witchcraft in several counties is supposed to do a great deal of mischief; in these, and similar cases, such losses will be attributed to it; and he who shall dare to disbelieve it, will be considered as an atheist. But what is this witchcraft? a power supposed to be communicated by the devil, or by many devils (for the chief cannot be omnipresent) to some ugly cross old woman, to do what mischief she pleases to her neighbours, who do not please her; an opinion founded in paganism, nursed in superstition, propagated by oral tradition, and believed with as

steady a faith, by these credulous simple ones, as the most sacred tenets of the Gospel. Such people should consider, that if Providence “suffers not a sparrow to fall without his permission,” it must be the height of absurdity to suppose, that infinite wisdom and goodness will permit, much less give a power to dæmons, or women, because they are *old* and *ugly*, to injure their neighbours, in a supernatural manner, according to their own capricious, foolish, and unjust resentments.

242. Doubtless the lovely females, blooming in virtue, youth, and beauty (such is the will of Heaven) have always had an inherent power of fascinating the mind and body of man: and this has been exerted not only among the gentle rustics of the peaceful village but emperors and heroes, philosophers and divines, recluse monks, and men of business, have all *felt* and yielded to its irresistible sway.

But from such a wonderful influence the Bees are entirely exempt. What disasters befall them generally arise from the ignorance or indolence of those who superintend them.

243. A Swarm consists not of all young, as many falsely imagine, but of a Queen, of Drones, and of working Bees, both old and young; and such as happen to be at the doorway, when a Swarm rises, go off with it.

244. The lying-out, or clustering of Bees, on the outside of the hive, is often a great diminution of the expected profit; and also accustoms them to habits of idleness. It is occasioned by the continual and large increase of young,

young, whereby the hive becomes so crowded, and in the day time so hot, as to oblige great numbers of Bees, to lodge or cluster on the outside, and about the door-way and front of the hive. Frequently at first they only lie out in the day-time; at night the hive being cooler, they are collected closer together, whereby the whole are admitted: but unfavourable weather, the want of a Princess, or of Drones, preventing their swarming for some time, they become too numerous for the habitation to hold them, either night or day.

245. Pure necessity obliges them at first, but afterwards they contract a liking to their new situation; others also daily join them in their idleness, and in such numbers, that often there are as many Bees on the outside of the hive as within. In consequence of this, the young Princesses, who always reside within, not having a sufficient number there, or inclination to form a Swarm, none will rise; until growing too late in the season for swarming, they at last betake themselves to build some combs by the sides of the hives, or under the floors, and there remain until autumn: not but there may be some exceptions. I have known Stocks increase so fast, that notwithstanding these exterior clusters, they have swarmed, and left the idlers behind; who afterwards perceiving room enough within, quitted their stations, and entered the hive again.

246. It not unfrequently happens that their lying out, and that for several weeks, and

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with favourable weather, is owing to there being no Princess yet born, or in a condition to lead them. This I conjecture from having many times observed my box-hives crowded, well stored with Drones, and the Bees seemingly desirous of swarming, but yet did not, for a considerable time. Now as several royal cells were close to the windows during this time, but not finished or sealed up, no Swarm rose until some time after they were so: on the contrary, when there is a very forward Princess, or perhaps several competitors, a Swarm will rise without any previous indications, and when the hive is far from being crowded; consequently such Swarms will be always small.

247. It is obvious, that a large quantity of Bees lying out inactive, at the most critical time, when their labour might be of the greatest service, must be a very considerable loss to the owner. For instead of this, if they had swarmed in that time they might have filled a hive with honey, or produced as much in an additional hive, had one been furnished them. A strong indication this in favour of our double method. Another inconvenience is their hindering and obstructing the passage of the other Bees, and by their example inciting many others to be as idle as themselves: No uncommon case among idlers of the human race! Nor is this all, for having obtained this indolent habit, it will be communicated to the next generation; for it is observed,
that

that Bees from these Stocks are much more apt to lie out than any others. For the prevention, see (249).

248. Many persons on seeing such clusters of Bees upon their hives, have imagined, that by getting them into an empty hive, they should have a complete Swarm; but those attempts have always been unsuccessful, all the Bees uniformly returning home again, and clustering as before. The reason is, they have no Queen with them: without whom no separate Swarm can possibly be established. For the treatment of Bees that lie out for want of previous care, see (282).

249. An objection perhaps may be made against the raising of hives, in order to cure them of lying out, viz. that it will prevent their swarming. It has been shewn, that it has not always that effect (229). But if it had, they had better not swarm at all than lie out. The Bees themselves will be the best judges; but, supposing they do not swarm, they are not idle, but fully and continually employed in compleating their own hives, and filling the new apartment you have enlarged their habitation with. We will likewise suppose so bad a season, that they cannot spare you a hive of honey the present summer: Notwithstanding this, as their increase of brood has been continual, the next year they will make you amends for your forbearance: by being not only a powerful Stock, but also by complimenting you with a large and early

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early Swarm; and probably, with a hive of honey, as an additional recompence.

250. Several signs or tokens are described by different authors, portending the *rising of Swarms*. Those of most note, I shall present to my readers. The first symptom of a Stock's being nearly in a condition of swarming, is their populousness, and the appearance of Drones. The first is known by the more than ordinary concourse of Bees going in and out. Also, by rapping against the body of the hive in the evening, judgment may be formed of their strength by the buz; and when many of the Drones are seen, it denotes that there has been plenty of Bees for some time.

251. Hives that are very full of Bees will make a noise almost approaching to roaring; so much so as to induce one to imagine they are just going to swarm, it shews indeed their impatience to swarm, but also that they have no Princess as yet equal to the task; and therefore this noise may be continued several days before their flight.

252. Should a Stock in the morning, instead of working, remain playing about the hive, it is a sure sign they intend swarming that day, the weather permitting; but they as frequently rise at the very instant that multitudes are going in loaded, many of whom go off with the emigrants. Usually before their flight, there is an uncommon buz, that may be heard at a considerable distance. Hives that stand fronting the morning Sun will rise earlier in the day than those that stand to the south or west.

253. Lyi

253. Lying out is a sign of their desire of swarming. First Swarms frequently rise without shewing any *other* sign than an increase of numbers. First Swarms are often divided or broken, by some casualty, as a sudden storm, dark clouds, showers, thunder, or by tinkling before they have all done coming out. By these noises the remainder are intimidated, and stay behind; or if the whole be out, either fearing a storm, disliking their pitching-place, being too much disturbed in the hiving, or losing the Princess, they return back again. The Princess going out with them, being sometimes too weak for flight, drops down by the way; in this case, she may be often found, when if placed in sight of the Swarm, the Bees will presently settle round her.

254. A first Swarm, except it happens to be broken, is worth two or three after ones; or, as they are generally called, Casts and Colts: but when this accident befalls it, if the next comes forth one entire Swarm it will be better than the first, though perhaps it may leave the mother Stock too poor. (231)

255. Butler observes (as do also several other writers both before and after him) that three or four nights before a second Swarm rises, there is a peculiar noise in the hive, very different from the usual buzzing of Bees, and which is heard upon no other occasion. Mills, * (who seems to be no Bee-Master) treats this as an illusion of the imagination; I was of the same opinion, until accidentally standing by

* Essay on Bees.

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my bee-house about ten o'clock at night, I was attracted by these very unusual and musical sounds. Persons versed in music can tolerably judge of an octave; such these respective notes appeared to me, and such also as could not be made by the wings, but seemed as if proceeding from a tube. What the intention of these notes might be I pretend not to determine; whether they be made at stated periods before second Swarms rise, is not much to our purpose; because it is not likely that many Apiators will have either time or inclination to watch these notices, therefore it is a matter rather of curiosity than of utility.

256. Butler indeed, writes, that, "First
" Swarms rise without these notices; but
" after Swarms or Casts hardly ever without;
" From the 8th to the 11th day after the
" first Swarm is departed, the other young
" Princesses that are pregnant, will make
" the like petitions. Consent being had,
" the young Queen the next morning comes
" down near the floor, and there calls much
" louder, and at the moment of swarming,
" the notes are more frequent and shriller;
" and then issues the buzzing multitude."

257. " If rainy or tempestuous weather,
" prevents their second or third Casts, until
" beyond the 14th day, one of the young
" Queen's is slain on the morning of the 15th
" day, lest a sedition should be raised, and a
" civil war overturn the empire.

258. " So sensible are the Princesses of
" their tragical fate, if left behind, that some-
" times

“ times two or three will accompany a single
“ Swarm; or if the weather continues indif-
“ ferent a considerable time, often one more
“ bold than the rest, will coax as many com-
“ panions as she can, and though only a few,
“ will lead them forth, trusting to fortune
“ for success.

“ If the first Swarm be divided or broken,
“ the second will call, and swarm the sooner,
“ probably the very next day, and there-
“ by occasion a third, or sometimes a fourth,
“ but all within a fortnight after the first;
“ unless prevented by bad weather, or ex-
“ cept in some extraordinary plentiful years
“ and situations both for brood and honey
“ gathering.”

259. When two or more Princesses accompany one Swarm they usually settle in different clusters; but those of the smallest seldom tarry, joining themselves to the larger body, the young Queen following.

260. As to second Swarms, much less Casts, very few are ever worth keeping, without the situation and season have been uncommonly favourable. The reason is, the Bees of every Stock have to provide for, and take care of, a numerous brood, as well as to collect honey; but as after-swarms are but few in number, compared with the first, they must fall short, in performing both these tasks in any degree adequate to what the first can do; but as they are more intent upon the increase of the brood than procuring honey in autumn they will not have a sufficiency
of

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of honey to support them until the next season, and therefore will die of famine. Or if taken, the honey will be but trifling; whereas, had they been united to a Stock, or several of these Casts incorporated together so as to form a good Swarm, it would not only preserve them for next year, but also yield a good profit.

261. It is usual with the Bees before they swarm, to send out messengers or quarter-masters to seek out and prepare proper habitations: empty hives left in a garden, will sometimes be chosen. In such a case, two or three hundred Bees may be seen going in and out, to clean the hive: on seeing this, you may depend upon a Swarm entering into it within a few days. I have often experienced this myself, as well as some of my neighbours. The same may be observed of hollow trees, vacancies under the roofs of houses, and other similar places.

262. It may be readily known that a Swarm has escaped, if the Bees in going in or out do not seem near so numerous as before.

263. Notwithstanding all that has been written respecting the signs and tokens of the rising of Swarms, I am fully satisfied from my own experience, that they are very fallacious, and not to be trusted to, without running the utmost hazard of losing some of the Swarms; and I am well persuaded that the only security is keeping a constant and close watch over them, (278) from the time they begin to be considerably

siderably increased until the swarming season be over. For they will frequently rise in such very indifferent weather, and sometimes so very early in the season, that no one could have suspected any such thing. In these circumstances they frequently fly quite away without settling at all; and without giving any previous signs, or intimations of such a disposition.

264. As no Swarm ought to be kept unless a good one, whether it be a first, a second, or any other; but must be returned again (370) or united (366) it may be both useful and amusing to estimate the weight, measure, and number of Bees, sufficient to make what may be truly called a good Swarm.

265. "It has been found, (says Butler)
"that a larger number than 40 or 50,000
"will not thrive together in one hive.
"Swarms often amount to 30,000. A large
"Swarm may weigh eight pounds, and gradually less to one pound; consequently, a
"very good one weighs five or six pounds, a
"moderate one four pounds. No Swarm
"less than this should be kept, but united
"with others."

266. I disagree with Butler in this. For I think a six pound Stock is full little enough to turn to a good account; especially in the double mode; where they ought never to want room, consequently such a Swarm in a tolerable season will furnish a hive of virgin honey. Therefore, all Swarms, less than *six* pounds,

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pounds, especially in moderate situations, I would recommend to be united with small Swarms or Casts. If there be enough to make half a bushel, it will be still more eligible.

267. The following estimate is given us by different writers of the weight and number of Bees :

BUTLER.	Natural History of BEES.
280 to an Ounce	336 to an Ounce
4,480 - - a Pound	5,366 - - a Pound
40 or 50,000 to ten or eleven Pounds.	43,800 - - 8 Pounds.

WILDMAN.	According to my own Estimate.
308 an Ounce	290 an Ounce
4,928 a Pound.	4,640 a Pound.

915 Half a Pint	3 2 $\frac{1}{2}$ oz. dr.
1,830 a Pint	6 5 $\frac{1}{2}$
3,660 a Quart	12 10 $\frac{1}{2}$
29,280 a Peck	6 5 6 lb. oz. dr.
Winchester Measure.	

268. The disagreement of weight and measure in these several experiments seems to arise from the different state of the Bees at the time of examination; for certainly they must weigh and measure more when their bellies are full than when empty, the case of Stocks that die; also those loaded with farina, weigh and measure more than those only with honey. This was fully confirmed to me by experiments made at different times, which always varied; but from the average

average of the whole, the calculation given seems nighest the truth, at least it is sufficient for any purpose the practitioner may require.

CHAP. IX.

PRECAUTIONS and RULES to be observed in the Managing and Hiving of SWARMS.

269. **I**T will be highly prudent to have your hives in readiness before the Swarms are likely to rise. For want of this necessary forethought many Swarms have taken French leave, and been heard of no more.

270. The inside of straw hives should be rubbed with a stiff hair brush, or coarse cloth, to get off the little bits or snags of straw; which otherwise will occasion the Bees a great deal of trouble and loss of time to gnaw off, when they might be more usefully employed in building their combs.

271. Boxes also should be cleaned from all little splinters, or other roughness, and made as smooth as possible; every hole or crevice must be stopped up with putty, or the Bees, to keep out the air and vermin, will be
 I obliged

obliged to do it with propolis ; for what you may do with one stroke in a moment will cost them many minutes, and perhaps the labour of hundreds.

272. I use no other preparation to my hives ; but perchance some good dames may not be satisfied with this simplicity, and therefore I would recommend to them if they must do any thing more, to rub the top of the hives with a mixture of ale and sugar, or of ale and honey : but in boxes, the rubbing the upper part and sides with wax will be best, as being not only agreeable to the Bees, but also enabling them to crawl up the hive with greater ease. Rubbing hives with sweet herbs is of no use, for it is the honey at the bottom of the flowers that the Bees are fond of and not the leaves. How ridiculous to use *fennel*, a plant they hardly ever approach, as if *that* would intice them. In short, they seldom dislike their hives if they have got a goodly company, and a good *mistress*.

273. Those that continue to use common hives, should have several of them, from two to three pecks each, in readiness ; because Swarms differ so much in magnitude, that a two-peck hive may often prove too small ; but no Swarm should be put into a hive less than half a bushel. However, after the Bees are hived, if they be not contented and quiet, or lie out, it will be proper to raise the hive by placing two or three rounds or more of an old hive underneath so as to make it high enough to receive the whole.

274. Straw

274. Straw hives or boxes, with openings at top, have this advantage, that if not sufficiently large, another can be immediately added without any difficulty. After having once put a large Swarm in one of my boxes, I perceived the Bees to be very much displeased, and in great confusion; I immediately placed another box over them, but still the uproar not only continued, but increased, and the Bees began to pour out of the box: conjecturing then, that they had lost their young Princess, I examined the ground near the box, and found a small cluster of Bees, in the midst of which was the Royal Lady. I immediately took her up, and placed her at the door-way of the box, from which the Bees were running; a stop immediately ensued, a retreat was founded, the emigrants returned, and nothing was to be heard but acclamations of joy.

275. If for several years together Swarms come late, and perhaps some Stocks do not swarm at all, though the seasons be tolerably good, it may be taken for granted that the hives are too large, or the Stocks too many: on the contrary, if the Swarms be too early, and but scanty in number, it indicates the hives to be too small: a single year cannot determine this, seasons being so very different from each other; something therefore must be left to experience, and each persons sagacity.

276. Hives are generally splected, that is, small sticks are placed within the hives to

support the combs, and keep them steady. Country people fix too many, and these also so improperly as to render it impossible to take the combs out without smashing and mangling them, by this means fouling and wasting the honey. The Bees are endowed with ability sufficient to fasten their combs, provided the hives are not to be moved; but as this is requisite, one stick fixed across the hive, within about two inches of the bottom, and from right to left, will fully secure the combs, upon any necessary removal or inversion.

277. For as the Bees generally build their combs in parallel lines to the door-way, the spleet or stick being placed at right angles, or the reverse of the combs, each of these will necessarily rest, and be fastened by the Bees to the spleet, thereby rendering any more superfluous. When the combs are to be taken out, a notch is to be cut in each comb as far as the spleet, which may be then pulled up, and the combs taken out entire.

278. During the whole season of swarming the Bees should be carefully watched. This season is sometimes very long. In the year 1779 my Bees were obliged to be watched from the beginning of April until the end of July; but this is seldom the case: however so long as any Stocks have not swarmed, they certainly require to be attended to. In some years a month will be long enough. Those who keep half a dozen Stocks or more may get poor children to watch them for a trifling

trifling reward; and thus at a small expence serve themselves and a poor family at the same time. In the *longest* season it cannot exceed half a guinea. Supposing only one Swarm to be saved by this means, it will pay the whole; but in general the expence will not be near so much. A constant watch however ought most certainly to be kept: For Swarms very frequently rise, as has been observed, without shewing the least symptom of their intention. Many Swarms I have lost formerly by not attending to the profitable doctrine of constant watchfulness: for as Swarms often rise suddenly, if a person be absent but five minutes the Swarm may be gone.

279. The swarming hours are generally reckoned to be from nine o'clock to two. This is very wrong, for Swarms frequently rise as early as eight, and as late as four. Whoever therefore trusts to fewer hours will often sustain a considerable loss; as will also those who trust to their not swarming in indifferent weather: I myself have had, and know many others who have also had Swarms rise in what we may call cold weather in May, and in misting clouded days. The Bees are a people so uncertain in their motions, that a constant eye must be kept upon them in all weathers, except indeed a hard shower of rain, hail, or snow. Let us not therefore to save a few shillings, run the hazard of losing pounds. No one ought to expect to be suc-

cessful with Bees, any more than with pigs or poultry, which profit but little without care and attendance.

280. The disadvantages of the Bees *lying-out*, have been already treated of, (244) we now proceed to point out the only remedy against this vicious habit that can turn to any profit.

281. When a Stock is not wanted to swarm, it should be *raised* as soon as the Bees begin to work briskly, stopping the bottom door-way until full swarming-time; for if they are not raised until they seem to want it, the doing thereof will often occasion them to Swarm; on the contrary, when a well replenished Stock is intended to swarm, but the Bees begin to assemble in idleness, they may be permitted to do so four or five days, but no longer.

282. This idle habit should be broken by raising the Stock, rather than suffered to increase, though swarming during the whole season, should be prevented by this proceeding: for frequently the disturbance of raising provokes them to swarm in a day or two afterwards; and therefore a strict look-out must be kept.

I once had a box Swarm, which afterwards layed out, notwithstanding as many glass vessels were set over them as amounted to a peck; much work being done in the glasses, I did not choose to take them off, and therefore a little box was screwed on over the cluster and door-way; and a fresh door-way

made

made therein. They built in that box, and succeeded well, when taken away as soon as honey-gathering ceased. Where Bees are kept in common hives that cannot be conveniently raised, any convenient vessel placed over the largest cluster, and fixed as near the door-way as possible, will answer the same purpose; the best time to do it, is after the close of the day, either by moon-light, or by a candle and lantern; but at no nearer a distance than just to see how to perform the business.

283. But should this not succeed, having put on a pair of gloves, and secured your face with a mask, at the close of evening, or rather at day-break, hold a hive, or other vessel under the largest cluster that lie out, gently pushing the empty hive upward, that as much of the cluster may hang in it as possible; then with a stiff wire, slip of tin, or thin stick, drawn closely and very gently against the bottom of the floor or stool, separate the Bees therefrom, so as to fall into the hive underneath; or, the vessel or hive itself drawn by a skilful hand against the bottom, will have the same effect.

284. But if they cluster *round* the hive, and not underneath, hold the bottom edge of an empty hive, so as to be even, or upon a level with the stand; then with a brush or rather a wing, gently move the cluster forward, until they fall into the hive; but if they hang about so inconveniently that this cannot be effected, they may be taken up by
I 4 a spoon

a spoon and put into the hive (384). Should there be danger of some of the Bees falling on the ground during the operation, a cloth spread thereon, will receive them, and being afterwards laid over, or about the skirts of the hive, the stragglers before morning will be returned home.

285. The Bees you have taken may be returned to the Stock, which in the interim should be raised by an ekeing, or lift, that is, two or three rounds of another hive placed under them; or, for want of these, by stones or portions of bricks laid at proper distances underneath. Then take the hive or vessel that has the outliers in it to the old Stock, turn it upside down, and strike the edge forcibly upon a floor or stool, close to the Stock; the Bees will fall out and join the family before morning; then close all the openings with clay or cow dung, leaving only the usual entrance. Thus having sufficient room, they will either immediately begin to extend their works, or swarm in a day or two after. A cover should be suspended over them during the night; and also over such Bees that lie out, lest hasty showers wash them down, and destroy them.

286. Another method is to take the old Stock off the stand, raise it as before directed, and set it upon a stool about a foot distant from the stand. Then lay a small piece of board from the Stock to the stand, to serve as a bridge. Let them remain in this situation all night. The noise of the Stock, occasioned

casioned by the removal will alarm the cluster of idlers, who missing the heat and connection they before had, will presently be in motion and anxious to find their companions; this they will soon do by passing the bridge; and now finding ample room, will be received with joy. The Stock the next evening may be set in its usual place.

287. But if you want Bees to strengthen a weak or backward Stock; strike them out (260) at night before the Stock, and by the morning they will be incorporated; or, (and which is the best mode) take a bucket, pail, &c. or four or five rounds of straw cut out of an old hive. On either of these, turn the hive of idlers upside down, and immediately set the Stock over them.

To HIVE BEES *properly*.

288. I would recommend no other defence than what I use myself, and which few persons will probably object to or think extravagant. My meaning is, to drink a cup of good ale, and to rub some of it over your face and hands, for as the Bees love the smell of this liquor, when good, it will be no small recommendation to their favour. While this agreeable exhalation therefore is rising from you, cast away fear, for you may hive them with safety, provided it be done with care and proper precautions. Boldness and gentleness are now equally necessary, every motion must be deliberate, and without any hurry. Be particularly careful not to crush any of the Bees,

Bees, for the smell of their bruised bodies will excite the rest to fury and vengeance. Great care is at this time peculiarly necessary, as without circumspection, you may even kill the Queen herself, as is too often done, and which will infallibly occasion the Swarm, though well hived, to return home.

289. There is little danger to be apprehended from the Bees when they swarm, because at that time they have many fears and apprehensions, and are therefore uncommonly gentle and pacific. At such times I have thrust my naked hand up into the middle of a Swarm as they hung upon a bough, without the Bees shewing the least resentment: which, had they been in their hives, they would not have suffered without the utmost indignation. But in bad weather, especially if it be windy, they become more irascible, and will not suffer any one to be quite so familiar with them; a pair of gloves will then be necessary.

290. Some are so very simple, as either to fumigate the Bees with smoke, or throw water on them, from a notion of making them settle and become more quiet. But so far from answering this purpose, it destroys many of them, and makes the rest so desperate as not to be hived without great danger. And even when this is accomplished, they are so irritated at such uncivil usage, that they frequently rise out of the hive, and fly quite away. Whereas, let the business be done with patience and circumspection, they

they may be hived, however badly situated, without any of these inconveniences.

291. Swarms are often divided by such injudicious management; part of them returning home, while those that remain, being so much diminished, form but a feeble Swarm, and of little value.

292. It sometimes happens that a Swarm divides while hovering in the Air, and some fall to the ground. You must examine in this case with great care, for if you find any, it is very likely the young Queen is among them; if she is, place her *upon* the empty hive, and take it as near as you can to the Bees swarming: if only a few see her, they will give notice to all the rest, and presently settle upon the hive, over this another may be placed, into which they will ascend, without further trouble. But if the Queen be not found, the Bees, though well hived, will not remain but either fly quite away or go back to the Mother Stock, or endeavour to gain admission into some of the other Stocks, thereby occasioning tumult and slaughter.

293. It has been an ancient custom to make a tinkling noise upon a pan, kettle, or the like, when a Swarm rises, as being thought conducive to make them settle the sooner, and prevent their flying away. This has been objected to as of no use. I once thought so, and thereby lost several Swarms. Many times I have forebore tinkling until they were almost out of my premises; but on striking up a serenade upon a large watering
pt,

pot, they have always settled; and I have never lost a Swarm, since I have used this method, or had them settle at any great distance.

294. I have known of several Swarms flying over large commons, that merely by the tinkling of a key upon a fork, have been immediately struck with attention, and their flight being stopped, have settled on the ground very near the rustic musician.

295. The reason may be the same, as that which induces Bees to return precipitately to their hives at the approach of a thunder storm. Tinkling has the same effect, as far at least as the sound extends; the explosion of fire-arms produces the same, but in a much shorter space of time; as it will cause them to settle almost instantly; and consequently within due bounds, provided the explosion be made on that side to which they are flying too far.

Not that the Bees are fond of music as some fondly imagine, for my Bees have often had variety of *that* near their hives, without taking the least notice of it.

296. As the practice of tinkling has been of a very long standing, and is no ways hurtful, I see no good reason for its disuse; besides, it is absolutely necessary in another point of view, viz. to ascertain your property, which otherwise might be disputed, if the Swarm should settle in another person's premises. For the tinkling secures a *legal right* to follow your Swarm upon another person's grounds

grounds in order to hive them; making good any damage you do thereby.

297. Particular care must be taken, not to begin tinkling until the Swarm is all out, lest you intimidate the others, and prevent their rising.

298. If notwithstanding your noise, they seem not disposed to settle, or they fly too high, throwing up sand or dust among them, will cause them to keep within bounds, and the sooner descend. As soon as ever they begin to settle, immediately cease all noise, that those on the wing may hear the sounds of those that are fixing, and be allured to join them.

Whistling or any other noise is then highly improper; for the more silence, the sooner they cluster. For when once a part is fixed, there is no danger of the rest not following.

299. Before Swarms are put into one of my hives the barred top should have a hole made at each end of the middle bar, to admit a four-penny brad, long slender nail, or peg, to pass through into the edge of the hive, in order to keep it firm in its place; the straw top must be fastened on; this is best done by making four loops with a strong pack-thread, drawn through the hive, near the top edge, at equal distances, and long enough to meet at top within three or four inches, and drawn together by another piece of pack-thread, and fastened by a knot upon the top.

top. If a box be used, the top must be screwed on.

300. If a Swarm or Cast is rising from a Stock, contrary to your wish, immediately with a handkerchief, or the like, stop the door-way for some time; this will baulk and perhaps deter them from swarming afterwards. But if the young Queen rose with the few that first issued, these will not return again.

301. When a Swarm is upon the wing, have an eye to your other Stocks, and if any are preparing to rise, stop them, until the Swarm is settled. Then, if another rises, and attempts to unite with the first; cover these immediately with a cloth, until the other is also fixed; and so for any others. For if double Swarms be hived together, there will be a terrible slaughter, until one of the Queens be killed; or sometimes the whole Swarm will quit the hive, and fly quite away.

302. Although Swarms will often rise at the very instant when the greatest business is carrying on; yet, when it is a favourable day, and they are observed not to work, and but little noise in the hive, a Swarm will surely take wing in an hour or two afterwards. Sometimes, also, there is a sudden throng of Bees at the entrance, making loud alarms, as though going to swarm, when it is only the expression of joy for the appearance of a large delivery of young at once.

303. If

303. If a Swarm rises and returns back again to the Stock, and you perceive them before many are got into the hive, immediately take the old Stock away, and set an empty hive in its place; by this manœuvre, the Swarm will be deceived, and settle quietly therein. It should then be placed at the most distant part of the Apiary, and the Mother Stock set in its own place again. But if the Swarm should be tumultuous and uneasy after it is in, set the old Stock close to them, and they will soon be re-united to them again. For in this case, it is plain, they either had no Queen with them, or had lost her in their flight. Though there are other causes of a Swarm's returning, as too much wind, clouds portending storms of thunder and showers.

304. The form in which a Swarm hangs from a bough, is that of an inverted cone, big at the top, and tapering to the bottom; the point being only a single Bee; they adhere together in this manner, by hooking themselves to each other by their feet. But at other times, when the plant or tree will not admit of their being thus suspended; they spread round the body of a tree or branch, (fig. 5.) or upon a hedge, bush, shrub, &c. in a variety of directions, often very inconvenient for hiving.

305. Low trees near an Apiary are very useful, for they attract the Swarms to settle on them, which are thereby more easily hived.

For

For Swarms will sometimes fix of their own accord near the Apiary, though no notice had been taken of their rising. But such instances are too precarious to be trusted to; and they will much oftener fly away without clustering at all. A branch of a tree, or a hive, fixed upon a long pole, and lifted up among a Swarm, when in the air, has inticed them to settle thereon.

306. No time should be lost to hive them as soon as clustered; for the longer they hang, the more irritable they become, and the more unwilling they will be to hive. For when once fixed, they send out scouts to bring tidings of a proper habitation, and no sooner do these return, and touch the cluster, but there is a general shake of the wings; after this, they presently unknit and depart, unless they be immediately hived, and then it is a chance if they will stay.

307. A large cloth or apron, and a hive floor or other board will be useful in the hiving; spread the cloth upon the ground as nearly under the cluster as possible; on that place the floor, and a stick about an inch thick laid across; so that when the hive is placed thereon, there may be ample room for the struggling multitude to enter the more freely and sooner in.

308. Or a Swarm may be shook off a branch or shrub, into a cloth, properly held under by an assistant, and the cloth with the Bees therein, immediately laid on the ground; then placing a hive over the Bees, supporting

supporting one edge, a little raised, by a stone, or something convenient, so that no Bees be crushed, and they will soon ascend up into the hive without any further operation, but that of screening them from the rays of the Sun.

309. If a Swarm hangs to a bough, or any thing that will admit of the hives sliding under them, first cut off, in the most gentle manner, any twigs that may be in the way; then with your left hand press the inverted hive upwards, to inclose as much of the cluster as possible, without disturbing the Bees, until with your right hand you give the bough a sudden and smart shake; this will cause most of the cluster to fall into the hive; among whom, in general, will be the Queen. Keep the hive in your arm as it is, until you have got to the board or cloth; (307) then gently turn it upside down; one edge upon the board, and the other upon the stick that lays across; any Bees that have tumbled out, as well as those on the wing, hearing the buz in the hive, will soon join them. With a few twigs, disturb those that attempt to settle again, and they will soon desist. But use no nettles, or water, which serves only to inrage and injure the Bees.

310. Cover the hive with a cloth, boughs, or any thing proper to keep off the too piercing rays of the Sun; for otherwise, the Bees finding their new habitation too hot, will be wise enough to quit it.

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311. If

311. If it should happen to be more convenient to hold a cloth or large apron under the Bees, than a hive to shake them into, let the former method be taken, and gathering up the cloth by the corners, very gently and tenderly bring it down, and manage as directed (307). To avoid repetitions; *either* a cloth or hive may be used, as shall appear most convenient, in any of the operations hereafter directed. Let the hive remain in this state until the evening, and then (taking away the stick) remove it to its appointed place. If taken away before, the stragglers will be lost.

But if it happens to be in a place inconvenient or improper to leave the Swarm in until night, as soon as ever the Bees are wholly got in, or nearly so, it must be covered with a cloth, and taken to its destined place at once: the stragglers that are left will return to the mother Stock.

312. It will also be proper to adopt this method when a Swarm is so very large as to impoverish the Stock; for by taking the hive away, as soon as a sufficient number are got in, the rest (sometimes a great number) will return to their former abode.

313. Should a Swarm settle so untowardly, that a hive cannot be conveniently held under them, a light basket will answer the purpose as well: the Bees being shaken into the basket, set it upon its bottom on the ground, then a hive being placed over it,
they

they will quit the basket, and fix in the hive.

314. Swarms often cluster in trees much too high to be come at without the assistance of a ladder, steps, table, or the like, and sometimes at the extremity of a small bough, at too great a distance to be reached with the hive in your hand. In this case, after placing the hive in readiness under the tree; and having prepared a sharp knife, and a saw, ascend the ladder, and gently cut away all the small twigs and branches that surround the cluster, and examine if the bough on which it hangs can be cut through with a knife, as this will disturb the Bees much less than the action of a saw. Keep the branch steady with one hand while you sever it with the other, or rather it should be held by an assistant, and as soon as cut through, be brought gently down, taking great care that the Bees be not touched by any of the other branches. Then lay the bough with the Bees on it, very gently on the cloth or board, and set the hive over it. Before the evening the Bees will be fixed to the top of the hive, having quitted the bough, which may now be taken away, and the hive put in its intended place.

315. But should it be impracticable, or hurtful to a tree, to cut off a branch, a basket or hive may be tied bottom upwards upon a long fork, rake, or pole, and held under the Swarm while another person shakes the branch, either with his hands or some

other instrument, so as to get as many as possible into the hive or basket; after which, the remainder are to be dislodged by a long stick, with small twigs tied to the end. Or they may be dislodged by twigs tied to the end of a long pole, until they settle more conveniently to be hived. At the same time the proper music, and fire arms, charged with powder only, must be in readiness, lest the Swarm take wing again, and now affronted with your treatment fly quite away.

It will be highly necessary in these troublesome operations to defend your face and hands. (73, 76.)

(316. Another very difficult case is, when they settle at a great height, round a branch of a tree not flexible enough to be shaken; the most easy method of hiving them is, to set a hive upon a board or floor, whereon are two pieces of sticks to raise the front edge of the hive about an inch, take this up a ladder (placed as close to the Bees as possible) and rest the board or its edge on the branch, as near the Bees as can be without hurting them. Then suspend or fasten the hive with cords to the other branches of the tree, or ladder, in the safest and best manner that circumstances will allow of. This done, with a spoon, gently take some of the Bees from the cluster, and turn them out of the spoon at the door-way of the hive, this repeat several times, and they will crawl into the hive. This method

thod may be continued as long as the other Bees shew no great resentment, or until you have got about a quart into the hive. Leave them a little while; the noise of those in the hive will incite the others to march therein also, and in about an hour the whole Swarm will have entered. But if instead of this, they seem not disposed to quit the branch, take more of them away by the spoon, at intervals, until the others begin to run into the hives themselves.

By patiently proceeding thus, there is far less danger, damage, and trouble, than by those irritating and violent means generally employed in these cases.

317. When Swarms hang too low to admit the passing a hive underneath, a cloth may be drawn under them, and a stick laid thereon; then shake the Bees down, and gradually withdraw the cloth far enough to allow the placing the hive over it. If there be any Bees already on the ground, they will soon hear the noise of the multitude, and join them. If not, the hive should be placed near them; or with a brush or wing, move the Bees nearer the hives, as shall appear most convenient.

318. When they settle in a hedge, fix a hive over them, either upon forked sticks, or any other contrivance. But first sprinkle the inside top of the hive with ale and sugar; but *only* at the top, because it is to that part we want to entice them. Wait some time, and if this should not succeed, introduce

duce a hive *underneath* them, as far as possible, cutting away such sprigs and branches as may obstruct its passage; then shaking the bush or hedge, cause as many as possible to fall into the hive, and continue so to do until they are wearied of returning to the hedge, or have gradually joined those in the hive, which they will do by this management in a little time. Lay two sticks across the hive, and set another over it, and by night those that are upon the ground, and on the outside of the hive, will be all gone in, and collected with the rest now ascended in the upper hive, provided the Queen be among them, otherwise she must be looked for among those upon the ground or about the hive.

319. Should they cluster round the body, or leading branches of a tree, apply the edge of the hive close to the body, a little below the spread of the Bees, and where there is the greatest bunch or cluster; gently press the hive upwards, and with a small stick, force down as many Bees as you can into the hive, but be sure not to hurt any of them; then removing the hive to other *parts* that have the largest clusters, do the same there; it is very probable the Queen will be among some of these. The hive must now be placed as near as possible to the tree, and the rest of the Bees will join their fellows, provided they are so disturbed as to prevent their settling about the tree again. As this is a very difficult case, the
Bees

Bees will be unavoidably irritated, and therefore the face and hands should be properly secured.

Though these methods will undoubtedly succeed, yet I have found the following much easier and safer, when the situation is not too high.

320. First, procure a sufficient number of tables, stools, or casks, that they may be set on each other so as to be of equal height with the cluster of Bees, or two ladders must be so placed as to admit a board from one to the other, sufficient to hold a bee-hive. This being done, hold the hive bottom upwards, and with a spoon gently take up as many as you can at a time, from the largest cluster, and put them carefully into the hive, until there be a quart or more, if the Bees will let you do it patiently; then turn the hive upon its bottom on the board or floor, already prepared; the edge of the hives next the tree must be kept a little raised, for the easier admission of the concourse of Bees that yet remain on the tree. When casks or tables are used, the stage formed by them with the hive upon it, is to be gently moved towards the tree, so that the edge of the hive-floor may touch the Bees; but if this should be inconvenient, a thin piece of board may be laid from the hive to the tree, as a bridge for the Bees to pass over; for the noise of those in the hive, will attract the notice of such as are on the tree, and you will presently see them begin to dislodge and pass the bridge

to their companions. This will be the sooner effected, if you gently stroke down those nearest the hive with a stick, or rather take from the largest cluster spoonfuls at a time, and put them upon the bridge near the entrance of the hive; for they will then go directly in, and when the greater number have entered, there is no danger but the rest will follow.

321. The usual way of brushing Bees into a hive enrages them most highly; this, however, is not all the mischief, for many are killed in the operation, and sometimes the Queen herself; in which case, the Swarm, even after having been hived, will fly away: nor will the Apiator himself be safe, unless very well defended. All these inconveniences are avoided by the gentle method just recommended; and to a lover of Bees, is as agreeable an amusement as hunting or angling to others: I perform it without even a pair of gloves, unless in a bad day.

322. Authors direct, as a general rule, that Swarms should always remain near the place where they settled, until the evening, as otherwise those Bees that have not settled and are hovering about, not knowing where their companions are placed, will return to the old Stock, and will be treated with the same severity as strangers. In the many observations I have made, I can assert, that such consequence never followed, but that they were received as kindly as though they had never parted.

323. When

323. When Bees settle in a hollow on the side of a tree or stub, clap the bottom of the hive so close against it, that not a Bee can escape: let an assistant hold it fast, and also tie a cloth round the edge, or with clay or the like stop every opening: being thus well secured, with a hammer or great stone, beat round about the hollow, making the greatest noise you can, which in a short time will so terrify the Bees, that for peace sake they will be induced to enter the hive: now and then cease the noise, and applying your ear to the hive, you will know by the buz when the greater part are in: you may then set the hive down, and disturb those that remain in the hole with small twigs, which at length will so weary them, as to make them enter the hive. Then stop the hole with weeds, or any thing at hand, and your work is done.

324. Swarms will frequently make a hollow tree their habitation. To dislodge them make a large hole with a chissel, hatchet, or other suitable instrument, as near as possible to the upper part of the hollow; for, if there be room enough, they will lie always above the hole they go in at: place the edge of the hive close to the hole, and forceably striking about that part of the tree where the Bees are, give them as much disturbance as possible; alarmed and terrified at the strokes, they will presently issue out through the hole, and very likely settle in the hive; but if not, on the branches of the tree, or on some other place, that may be convenient for hiving them

them. After being hived, they should be placed near the tree they came from, to receive the stragglers.

325. But if they lie below the hole, they enter in at, make the opening beneath them; and take care that the upper hole, by which the Bees are to issue out, be the largest: sometimes however, all these methods prove ineffectual. We must then have recourse to fumigation; this is done by placing old rags, damp straw, or any thing that will make much smoke, underneath the Bees, and setting fire to it, at the same time disturbing them as much as possible by violently striking the tree; this will generally cause them to fly out and settle elsewhere.

326. The same method must be pursued if any Bees remain afterwards in the hollows, or places of lodgment, to force them out; and to prevent their return, the holes should be stopped with nettles or other weeds.

327. Should they settle under the roof, or in any vacancies of a house or other building, a continued noise, beating, or drumming against the part they are lodged in, will cause them to quit it; especially if the place of entrance be very much enlarged.

If this alarm should not succeed, plenty of smoke may be conveyed to them by means of a funnel, which will most likely drive them out. But where smoke cannot easily be introduced, water poured over them by a funnel, or squirted on them by a syringe, will so affect them that the combs and Bees may be
taken

taken away by the hands, which however should be defended by gloves.

328. But in all these cases it should be observed, that the longer they have been settled, the greater will be the difficulty of dislodging them, especially if they have been some days, and have made combs; for they will then die, rather than relinquish them.

329. Therefore, where none of these operations take effect, the only way left (except that of destroying the Bees by the fumes of brimstone) is, for the Apiator to be armed cap-a-pee (73). He may then boldly break an opening into the building or wall, sufficient to put in his arm, and to take the combs away one by one; then having an empty hive or *two* ready, with several sticks half an inch thick, place the combs in the hives, and between every two combs put two pieces of sticks to keep them at a proper distance, so as not to crush the Bees that may be hanging upon them. If there be a comb containing young, it should be placed in the middle. Then setting the hive as near as possible to the place of lodgment, the other Bees will be enticed to quit their old residence, and quietly enter this new habitation. If the next day they work kindly, all is well: otherwise drive the Bees out (372) and take away the combs and honey, especially if it be at the latter end of the season.

330. When Swarms come into a room, as soon as they are all nearly in, close the windows and doors, that none may escape; let them

them remain until they have clustered, then cover them with the hive, and gently draw it along the wall or ceiling, to disengage them from it; afterwards take the hive, bottom upwards from the ceiling, and set it upon its bottom on the floor, with one edge a little raised up by a stick. Before night the rest of the Bees will go down and join their companions: they will do this the sooner if the room be so darkened that they may think night is coming on.

331. When straggling Bees come into a room, if the upper sash be pulled down, they will presently go out again; but where windows are not so constructed, the Bees should be gently brushed down to that part which does open, or otherwise they will beat themselves to death against the glass, as they always ascend to the upper part, where the greatest light is.

332. In many buildings, as well as in hollow trees, there have been lodgements of Bees for a long succession of years, without either hurt or profit to the owners. Swarms rising from these might be watched and hived as other Swarms are; and were a hive with honey-combs in it, especially with a brood comb, set in swarming-time over the opening or passage, by which they enter, it would be a means of enticing a Swarm to settle there. A hive, so prepared, and placed near them, will have the same effect.

333. Stray Swarms are frequently seen in their flight over fields and commons: these may be enticed to settle, by tinkling with a key

key upon a fork, by whistling, or by any other similar noise.

In such cases it will sometimes be a long while before a hive can be procured, and in the interim the Bees may reassume their flight: to prevent which, as soon as they are settled, throw your handkerchief over them, and tie it by the corners so as to inclose them; then cut off that part of the bough or sprig, to which they hang, with as little disturbance as possible, and you may carry them in this manner several miles with great ease and safety. But should they settle on the ground, spread your handkerchief, close by them, and with a whisp of grass or a small twig gently shove them upon the handkerchief; or if your hat be laid over them, it is likely they will ascend therein.

When you have procured a hive, and have laid the branch across a pail or pan, and two other sticks across, untie the handkerchief, and set the hive over the bough, resting upon the cross sticks; let it stand until night, and all the Bees will have entered into the hive: but if you have them in a handkerchief, without any branch, lay the handkerchief on the ground, untie it, and place the hive over it; the Bees will soon ascend therein.

334. There have been many instances of a Swarm settling upon a person's head (67). In this case, if any resistance be made, it may be attended with fatal consequences; but if you remain quiet and passive, without giving the Bees any affront or disturbance, not one will offer to sting you.

335. As

335. As soon as you perceive a Swarm disposed to settle on you, take off your hat, and carefully cover your head and face with your handkerchief; but if this cannot be done, place your hands hollow over your mouth, nose, and eyes, and then suffer them to settle upon you quietly, calling at the same time for assistance: or you may leisurely walk with the Bees upon your head, with as much safety and confidence as Mr. Wildman himself, until you meet some one to assist you: let him take a prepared hive, and hold it over your head, and the Bees will very likely soon begin to ascend therein; as soon as this is perceived the hive must be held a little higher, the better to withdraw the Bees from the head; this will be sooner effected if you go into a room considerably darkened. But should this method not succeed, the Bees may be taken off by a spoonful at a time, and put into the hive, until the greater part be taken off; then holding the edge of the hive so as to touch those that remain, they will soon crawl to those in the hive: or, by giving your head a violent and sudden shake over a hive or table, the greater part will fall off, probably the Queen, then walking to some distance, those that remain, missing the Queen, will soon dislodge in search of her; but, if instead of this, they remain quiet, and the other Bees return to settle on you, it is a sign you have still the Queen about you; whom, however, at the next effort, you will probably shake off; the
few

few then remaining, may easily be taken off by a spoon. Sometimes also a great smoke made behind a person, so as to blow over him, will readily dislodge them.

336. Should a Swarm attempt to fix upon or enter another Stock, cover the hive immediately with a cloth, and shut the door-way until they be settled and quiet; then set a hive over them, and in about a quarter of an hour open the Stock door-way, and by the four corners of the cloth lift the hive up and carry it to the place designed for it. Early the next morning the hive may be taken up, and the cloth removed; but if they have already made a lodgment upon the hive, stop up the door-way, and hold an empty hive, over the greatest cluster, and perhaps they will ascend; if not, take a spoon, and gently put a quart or two of the Bees into the empty hive, then set it over the rest, and they will follow; as soon as they appear to do so, open the Stock door-way. The Swarm should be taken away as soon as they have done ascending.

337. When two Swarms rise together and fight, the throwing of dust or sand among them will generally appease the strife, and separate them; or, they may be terrified into the cessation of hostilities by the explosion of a fowling-piece.

338. Should a Swarm fix very near the spot where another had been hived a day or two before, it will be necessary to place it four or five yards distance, or else many of the first hived Swarm returning to their alighting

alighting place, will repair to the new comers, and be killed. If a Swarm be too small, the next that rises, if not large, should by all means be added to it, which will make it a very good Stock.

339. It often happens, that two or three Princesses go out with a Swarm, and settle in so many clusters: when one cluster is very large, and the others small, hive them all separately; at dusk spread a cloth upon the ground, with a stick across, take the hives with the smaller clusters, beat the Bees out upon the cloth, and then set the hive with the large cluster in it over them; about two hours after this, lift them, cloth and all, upon a proper stand, and before morning they will be united with little or no slaughter; especially, if the small clusters have been sprinkled over with ale and sugar: let them remain in this situation until next night, when the cloth may be taken away. Another method is, about an hour after the small clusters are hived, to beat them out upon a cloth, and take the Princesses from them (384), and immediately to set the hive with the large cluster over them; or they may be first stupified (389), and then their Princesses taken from them; this will produce a firm union without any contention.

340. But it is not *always* that the Swarm separates, although accompanied with two or more young Queens, but will all settle together: however, as soon as they are hived great commotions and much slaughter will ensue before the Bees can decide which Princess,

Princess shall reign. If the competition be nearly equal, and victory long in suspense, all the Bees will quit the hive, in order to decide it more commodiously in the open air: they will then either unite or separate into distinct Swarms: in this last case to re-hive them all together, will be of no use, but may occasion the destruction of the whole: they must therefore be hived separately, and treated as Casts (366). But if they continue fighting in the hive until the next morning, it will be better perhaps to strike them all out of it; and they will then either separate or return to the mother Stock.

341. In these cases open hives have a great advantage; for by setting another hive over them, and leaving the door-ways open, the Bees will separate without quarrelling. The next night stop the upper entrance, and the Queen that has the fewest partisans will be expelled without much strife.

342. It does not always happen that they quarrel directly, though there be two Princesses; for sometimes they continue undetermined in their choice two or three days; but all this while they will be very restless and confused, nor attempt to work, until one be deposed and expelled, or slain.

343. All Swarms, if the weather be fair, will begin to work almost as soon as hived; but if the first day be foul, so as to prevent their going abroad, it discourages them so much, that on the second, though fine, they will scarcely look out; but when the third

L

day

day proves unfair it sometimes makes them so sulky as to choose rather to die than to seek for food.

344. Butler says they will live five or six days without honey, and when nearly starved they string down, hanging by each others legs like ropes: this is a certain sign of approaching death, if not directly relieved (733).

345. When all the Swarms are gone, if any young Princesses be left, they are generally killed two or three days after, and may be found dead about the hives; though they are sometimes respited until the execution of the Drones.

CHAPTER XII.

Of SWARMING BEES ARTIFICIALLY. Of
CATCHING *the* QUEEN; and Method of
UNITING SWARMS and STOCKS.

346. **I**T has been already noticed of what great importance the Queen is to the strength, support, and perpetuity of every Stock or Swarm of Bees. A *truth* the ancients were in some degree acquainted with; but they supposed the principal Bee to be a King.

347. Xeno-

347. Xenophon, * who flourished about 2000 years ago, seems the most ancient writer who has taken notice of this peculiarity. His words are very remarkable: "There is one particular Bee in every Swarm (or Stock) a leader of the rest, as one they willingly obey; where that remains, not one will thence depart; that removed, not one will stay behind, so strong is the affection they are inspired with to be governed by it." *word mass*

He seems doubtful of the gender, by characterizing it in the neuter.

348. The immortal Virgil sweetly sung on this delightful subject above 1700 years since. But with respect to any method of taming the Bees, or captivating the Queen, Virgil himself is silent. Columella, however, seems to have been acquainted with the secret, by directing one of the Queens to be killed in the union of Casts.

349. But the first account of captivating the Queen at will, is given us by father Labat; † who mentions, that he met with a man, who seemed covered over with Bees, his cap particularly was so covered as to resemble those natural Swarms that settle on a tree: he was ordered to take it off; the Bees then placed themselves on his shoulder, his head, and his hands, without stinging him or any of the bye-standers.

L. 2 350. In

* Cyropedia.

† Labat's Travels.

350. In like manner Swammerdam secured the Mother Bee of a Swarm, by tying a small bit of thread to one of her legs, and then fastening it to a long pole, the whole Swarm immediately assembled round the end of the pole, to cover the Mother Bee, and might be carried wherever the bearer pleased. Here we have the method of fixing Swarms, but from neither of these gentlemen can we learn how to obtain the Queen.

351. Sir George Wheeler * indeed, lets us into the secret, as told him by a Spanish priest, who said; he had caught the Queen with a *fly-catch*, and then cutting her wings, had obliged her to remain at home; but it may be doubted whether this be not a genteel evasion rather than an explanation: a hive cannot be turned up, and a fly-catch thrust therein to intangle the Queen. And to watch her going out, which is very seldom, or her return, requires more than the leisure and patience even of a priest,

352. It is surprising that Butler, who knew how to stupify the Bees with punk or mully puff, should not proceed one step further, and make use of it, in order to take the Queen, and manage the Bees at will: and it is still more surprising, that the sagacious Reaumur, who appears to have read Butler, should not have taken the *hint* of the narcotic fume; but was constrained to immerge the Bees in water, to obtain

* Wheeler's Journey into Greece,

obtain the Queen. The Rev. Mr. Thorley,* profited by the hint of Butler, and made use of it for the union of Stocks.

353. But Dr. Warder, § so long ago as 1712, gives a particular detail of a method of performing this seemingly mysterious business with ease and pleasure, and without fumigation or immersion, as to Swarms or Casts. Here he stopped. For the information how to catch the Queen of a Stock we are obliged to the ingenuity of Mr. Thomas Wildman.

354. This gentleman's extraordinary performance with Bees, attracted the notice of the curious few, as well as of the public; but however advantageous they may have been to himself, I fear they will be found of little utility to the world. Expectations were raised very high, and the most sanguine hopes conceived of the great increase of profit likely to arise from his mode of management.

355. Nor indeed should we have been disappointed, had the method of *Artificial Swarming*, which he describes page (133), ¶ (*allowing for a few alterations*) been found as practicable as it was expected to be. His words are, "If an old hive is so full of Bees, that they rest in the night under the board, and

L 3

" shew

* Thorley's Enquiry. &c.

§ The True Amazons.

¶ Management of Bees, 2d Edition.

“ shew no disposition to swarm, * turn the
 “ hive bottom up, give it some slight strokes
 “ on the sides, so as to alarm the Bees, they
 “ will immediately run to the extremities
 “ of their combs : if you look attentively to
 “ the middle of the hive, you will there
 “ perceive the Queen among the foremost, †
 “ seize her between the fore-finger and
 “ thumb, and confine her in your hand
 “ until most part of the Bees take wing ‡;
 “ let her then go, § the Bees will soon join
 “ her, and settle on some branch of a
 “ tree. Put them into an empty hive, put
 “ the old Stock in its place, || that the Bees
 “ which had been out in the fields might
 “ enter in at their return; and having re-
 “ mained an hour or so, it is then put on an-
 “ other stand near, or next their own: the
 “ hive having now what may be called a
 “ Swarm in it, is then to be placed on the
 “ stand of the old Stock, and if the Bees in
 “ both work regularly, carrying loads, all is
 “ well. This backwardness to swarm may

* This may be the case, and yet not be in a proper
 condition to swarm for two or three weeks after, for want
 of Drones or a Princess.

† I never found it so.

‡ Some may, but the main body will remain even
 though no young Queen be left in the hive.

§ Rather cut her wings, and fix her on something in
 sight of the Swarm, and which shall be at the same time
 most convenient for hiving them.

|| Rather at the farthest part of the Apiary or there
 will be abundance of mistakes and Quarrels.

“ be owing to their want of a Queen to lead
 “ them forth; and the old Queen is loth to
 “ go until a young one is bred; * yet if a royal
 “ cell contains a young Queen, the Bees in
 “ both hives will thrive; as those in an old
 “ Stock will go on in expectation of the
 “ young Queen’s coming forth.”

356. “ This separation should not in pru-
 “ dence be attempted, unless you have a
 “ Queen in reserve; † for if the Bees in the
 “ old Stock, when placed on their stand are
 “ in an uproar, there is no Queen, nor pros-
 “ pect of a Queen among them; and in this
 “ case their own Queen should be restored to
 “ them, and the reserved Queen be put to
 “ the Swarm; or the Bees in the empty
 “ hive, which should then be carried to the
 “ distance of half a mile, ‡ and remain there
 “ for a few days, until they have made some
 “ works, and may then be brought back to
 “ their former station.

“ Care should be taken that the number of
 “ Bees separated from the old Stock, be suffi-
 “ cient in number to make a Swarm; on this
 “ account it is *perhaps* better to use the fol-
 “ lowing method. § A sufficient number of
 L 4 Bees

* Consequently this operation will be labour lost.

† Aye! but Mr. Wildman has not informed us where
 or how to obtain this spare Queen. I doubt we may ruin
 some other Stocks in obtaining one.

‡ This must certainly be very inconvenient, trouble-
 some, and hazardous.

§ There is no occasion for *perhaps*; for most surely it
 cannot be done by the former.

" Bees should be taken out of the Stock, in
 " the manner that shall be hereafter directed,
 " and put in an empty hive. * The eye will
 " here judge of their numbers, when one
 " half, or a sufficient number, is got into
 " the empty hive, it should be carried to
 " some distance. The silence in either hive
 " will soon indicate where the Queen is.
 " It would be eligible that their own Queen
 " remained in the old Stock; but if she
 " does not, the reserved Queen may be put
 " to them, and they should be immediately
 " restored to their former stand, and the
 " Bees or Swarm taken off, be carried to
 " half a mile, as before."

357. I have only made a few cursory remarks,
 by way of annotations, as the principle upon
 which the whole is founded, is repugnant to
 the experiments I have repeatedly made, on
 purpose to ascertain its validity. Not that
 there can be any doubt, however, but that
 Mr. Wildman, among the multitude of hives
 he had turned up in his peregrinations,
 may have had an opportunity of swarming
 Bees in the manner described. But as I have
 often turned up hives, in order to seize the
 Queen, not only by myself but in presence of
 gentlemen, sufficiently conversant with Bee-
 Majesty easily to distinguish her, without
 ever obtaining by this means the desired prof-
 pect,

* So that this *following method* is a method to be taught
 us hereafter; and which we shall hereafter particularly
 remark upon.

pest. I cannot but conclude Mr. Wildman to be in an error. Besides, it is generally known that, on a hive being tapped, or any disturbance made, the Queen always retires for security to the inmost recesses of the hive, leaving her numerous guard to defend the out-works.

358. Therefore to clear this point up, a public experiment is necessary. Let Mr. Thomas Wildman go in the proper season into any judicious and practical Bee-Master's Apiary, and in his presence, and that of several others, equally conversant with the subject, take a Stock of Bees up and make them swarm upon his plan. This would, if successful, decide the point greatly to Mr. Wildman's honour.

359. I am particularly urgent upon this head, because the method, if practicable, may be easily performed, and without giving much disturbance to the Bees, and would therefore save a very tedious attendance in Swarming-time. Mr. Wildman also, in page 199, confidently repeats the same method of catching the Queen. Now if he can seize her majesty so easily, why pursue that other more difficult method of *driving*, which he is known to practice to obtain her? But even this favourite operation cannot be performed without being well armed: for every Apiator knows, and must have experienced, often to his smart, that in turning up a hive, the Bees, filled with ire, and armed with poisoned weapons, will attack him by hundreds, and make it very hot work, and
even

even dangerous to stand peeping after the Queen. Of this circumstance Mr. Wildman ought surely to have apprized his pupils.

360. However from this first instance it appears, that Mr. Wildman has no secret power over the Bees, to cause them to come out of their hives at the word of command, as many people have erroneously imagined; for at page 198 he disclaims all pretensions to any such power, and acknowledges the whole to be a manual operation, simply that of *driving* the Bees into an empty hive, and then catching the Queen.

361. But notwithstanding this declaration, the *truth* obliges me to observe, that he has led the public into the above error, by expressly asserting in his hand-bill (which I have seen, and have by me) that “the fourth Swarm” he will *command out of the hive.* As this is so repugnant to what he has given us in his book, the practitioners in the art will not be satisfied unless they have a direct proof in this instance, as in that before recited (358).

362 His method of driving is much the same as has been practiced for more than two centuries past. Butler describes it, and before him Lawson, Markham, and others, as well as a variety of authors since: therefore not to swell these pages unnecessarily, I shall only give those methods which I have found most convenient and eligible, and in such a manner that all the operations shall follow each other in proper order, and without interruption;

tion; after which we shall take the liberty of making such strictures and observations as we judge and hope may be of general utility.

363. But by way of introduction to the rest, we shall insert Dr. Warder's * account of his captivating a Queen from a Swarm, as containing many interesting and amusing particulars.

364. He tells us, "That to satisfy his curiosity, he was resolved to risk the loss of a Swarm; therefore about half an hour before sun-rise he took a Swarm of Bees that had been hived the morning before, to some distance from the stand, and striking pretty strongly the edge of the hive upon the ground, the Swarm fell out in a lump upon the grass. As soon as they were a little quiet, he stirred among them with a little stick, to find the Queen; at length he discovered her, and quickly taking her, he cut off her wings to disable her from flying, and put her into a little box with holes; the Bees left on the grass were soon sensible of their loss, spread themselves every way in search of their Queen, with a piteous and discontented note; in about an hour they rose, and flew to the place where they had pitched the day before, and divided in little parties to look for her along the hedge: he then laid the box with the Queen in it near one of these little companies, and they immediately began to
gather

* The True Amazons, 1712.

gather from all parts, and encompass her all round with joyful sounds, well known to those who are used to Bees.

365. "The experiment was often repeated, placing the Queen sometimes on one side, and sometimes on the other; by which means he could march or counter-march them in any direction he chose. It is very remarkable that though honey was offered the Queen while prisoner in the box, she would taste none while deprived of her family; nor did the Bees shew less affection for their Queen, they never would leave her, though kept five days and nights without food, at which period they all died martyrs to their loyalty; the Queen surviving them but a few hours."

To Unite two or more Swarms or Casts.

366 AFTER having a small Swarm or Cast, in two or three days or a week you may have some others, all of which are to be hived separately: about ten o'clock at night spread a cloth on the ground, near the first Cast, and lay a hive floor on the cloth, with a stick across, then take the hive which hath the second Cast, turn it up, sprinkle some sugar'd ale among the Bees, and then strike the edge of the hive with some force on the stick, which will probably cause all the Bees fall out in a lump; but if not, repeat the strokes until they do. The first Cast must be immediately set over them, and in about an hour those on the cloth will have crawled up,

up, and become one family. If any hang about the outside of the hive, with a stick or feather strike them off very gently upon the cloth, and when all are in, set the hive in its place: about five in the morning lift up the hive, floor and all, and withdraw the cloth, if there be any Bees on it, spread it over the hive, and the stragglers will soon enter therein: by crawling among each other all night, they become familiar and reconciled.

367. In the same manner a third or fourth may be added, until sufficiently numerous to form a strong Stock for the next year; but this must be done time enough for the Bees to lay up a sufficient store for the winter.

368. If this be done in the day-time, the Bees of both Casts or Swarms will immediately proceed to fighting, or fly away; but being done in the night, it causes very little commotion, and very few Bees, sometimes none, are slain, except indeed the invading Queen, who is generally dispatched or expelled before morning; being often found on the ground, surrounded by two or three hundred of her faithful subjects, who will starve themselves rather than abandon their beloved Sovereign: a sad and sorrowful scene, to prevent which she must be taken from them by a small stick, and then her subject Bees being placed near the entrance of the hive, will presently join the rest.

369. In hives or boxes that have openings in the tops, this operation may more easily

easily be executed, by raising the first Cast and setting the second or any other subsequent ones, under it, let it remain double until the next night, by which time they will be all in the upper hive, then lift it gently up, and take the under one away.

370. To prevent any affray, some have proposed to take away the Queen of the Cast when the Bees are knocked out, according to Dr. Warder's method, (364), and then to kill her. This, no doubt will certainly prevent slaughter; but it is very troublesome, and takes up more time than country people can or will spare from their other occupations; therefore, as the damage arising from the preceeding mode is but trifling, it would seem preferable for common use; especially if a little sugared ale is sprinkled over them, before they are incorporated. Casts in the same manner may be returned to the mother Stock, to prevent their being too much impoverished; which causes many to fail before the next season. These operations need no other defence than a pair of gloves.

371. Happy for Sovereigns of the human race, that the people are frequently sacrificed for their good; and the prince but very seldom for the people's.

To DRIVE or SWARM BEES Artificially, nearly
upon Mr. WILDMAN'S Second Plan.*

372. When a Stock seems very full of Bees, and discovers the usual symptoms of being ready to swarm; especially if there appear many Drones, and these begin to lie out, it will be necessary to perform this operation: therefore about the middle of a calm and hot day (if such offers), remove the Stock upon a cloth (laid ready upon the ground) and immediately taking it up by the four corners, carry it into some out-house, or the like, where but little light is admitted. Or it will be more eligible to have a straw hive made on purpose in the form of a basket, viz. narrower at bottom than at top; it should be wide enough to admit any common straw hive a little way within it, as far as three rounds of the straw. Set this close to the Stock, and instantly lift up the Stock and set it thereon; no Bee can then come out upon you; and when taken into the house, the whole may be turned upside down, viz. the Stock at bottom, and the empty hive upon it; by these means the inconvenience of many Bees flying out upon you is prevented, which must always be the case when a cloth is used. But a far better method than either of these may be seen (382). But in either way the hives are to be supported by the frame

* Management of Bees, page 193.

frame of a chair, a bucket, or any other convenient support; and if a cloth is used, an empty hive should then be ready, nimbly take the cloth off, and place the empty hive on; if it does not join close, tie the cloth so fast round as to prevent any Bees from escaping: with one hand support the hives steady upon each other, while you keep striking with the other hand about three parts round the full hive (for the part against which you stand must not be struck) from top to bottom as nimbly as possible.

373. By this noise and disturbance the Bees will be affrighted, and begin to ascend into the upper hive, where there is more quiet. After beating a few minutes, put your ear from time to time to the top of the hive, and by the buz you will discover when any considerable number is ascended up; until this happens continue the beating; sometimes it will be half an hour, though generally only a quarter before this be accomplished. If the Queen should happen to be soon disgusted she will quickly rise, and the rest will presently follow with a great noise.

374. If notwithstanding this, they do not rise, take a small stick in each hand, and beat round the hive smartly; the Bees by this time whether ascended or not, will be sufficiently tamed, so that you may raise the upper hive, resting on its edge next you, a little towards the light. If they be mostly got up, take the hive intirely off; but if not, hold it upon its edge between your side and left arm, and repeat the drumming against the part

where

where they have chiefly clustered (for the method must be varied according as you see the Bees affected) until you have got a sufficiency to form a good Swarm: then set it down by you upon a cloth or floor, and return the Stock to its place again. If the Bees of both hives are presently after quiet, and work kindly, it indicates that there is a Queen in each, and all will be well; at night the Swarm may be taken and set in the place designed for it, which should be as far from the Stock as possible: but should the Stock appear tumultuous and restless, it shews there is neither an old nor a young Queen. The Swarm must therefore be taken and set over, or by the side of it, the hive being raised by a stick, and the Bees, as well as the Queen, will return to the old hive again; otherwise your Stock will be intirely ruined.

375. If the Swarm has no Queen, it will soon quit the hive, and return home without further trouble. It will be proper to put an empty hive in the place of the Stock, to amuse the returning Bees, during the operation.

376. Thus we have a *second* method of forming a Swarm artificially, but without any regard to catching the Queen.

377. But by another process (besides the before-mentioned) Mr. Wildman gives us a slight notion of the matter under the article of joining a poor Stock with a rich, page 148, "For this purpose carry a poor and a rich hive, into a room a little before night,
M " then

“ then *force* the Bees out of both hives in-
 “ to two separate hives,” as before directed,
 (372) “ Shake upon a cloth, the Bees out of
 “ a hive that contains the fewest; search
 “ for the Queen,” (*how, in what manner?*)
 “ and as soon as you have secured her, with
 “ a sufficient retinue, bring the other hive
 “ which contains the greater number, and
 “ place it on the cloth on which the other
 “ Bees are, with a support on one side, and
 “ with a spoon shovel the Bees under it,
 “ They will soon ascend, and while under
 “ this impression of fear, will unite peace-
 “ ably with the other Bees; whereas had they
 “ been united to the Bees of the richer hive,
 “ while in possession of their castle, many
 “ of the new comers must have paid with
 “ their lives for their intrusion.”

378. By this means it is true we have all the Bees together; but he has forgot to inform us, what further is to be done with them.

However, we may guess at it from his further directions for uniting, page 223:
 “ The best method of uniting Bees at this
 “ season (autumn) is to take the Bees out
 “ of both hives, as already directed, then
 “ to strike the Bees of one of the hives
 “ upon a cloth, take away their Queen, and
 “ immediately place over them, the hive
 “ in which the Bees taken out of the other
 “ hive are. When united and quiet, the
 “ *hive with honey*, in which they are to re-
 “ main, is put over them, and they will soon
 “ ascend into it. This method requires too
 much

much leisure and patience to be generally followed.

My METHOD is:

379. Near the close of the evening, when the Bees, wearied with the toilsome task of the day, are retired to their "golden slumbers," I innocently invade their soft repose, by removing the weak hive into a proper place, with little light, and drive them (372) into an empty hive.

But here it must be observed, that the Bees will not be induced to quit the sooner, by the loudness of the noise, so much as by the quickness of the strokes, and the concussions of the hive; for which reason Bees quit a straw sooner than a box hive, wood suffering much less compression than straw. Now some Bees will always linger behind, however long you may drum (374); therefore, when the main body is out, those that rise upon the edges of the combs by beating, may be brushed or blown off by a bellows as they rise; but if many still remain, cut through the briar bindings, near the bottom, loosen the combs from the sides, and also the spleets; you may then lift up the rounds of straw, leaving the combs standing, and blow the Bees out from between the combs with a pair of bellows: they will not resent this so much, as being forced out by a brush or feather, nor will it injure them so much. In a box or hive of our construction, the combs are to be separated from the sides,

which being lifted up, leave the combs standing, as fixed to the bars.

380. As soon as it is fully evening, having all the Bees in an empty hive or box, which should be of the same dimensions as that of the rich Stock, (otherwise sticks must be laid across it and treated (372); turn the hive upside down, sprinkle the Bees with sugar and ale, set them upon a stool close to the floor of the rich Stock, which immediately lift off, and set upon the poor one; being thus doubled, place them where the rich Stock stood.

381. The sprinkling renders the Bees not offensive to the others, for by crawling among them it makes them smell all alike; and being done at night, they ascend gradually, and as it were imperceptibly among the others. I have frequently done it without a single Bee being slain. Let them stand thus four or five nights, having first stopped up the bottom door-way: after this time, you may at night take off the upper hive, and if all the Bees be out of the under one, or nearly so, take it away; should a few remain, turn the hive on its side, with its open part to the door-way of the Stock, and they will have joined the rest by morning; if not, strike them out upon a board or cloth, and set them to the Stock, and they will then enter without difficulty: but if only a few of the Bees should have quitted the under hive, double them again, and let them remain a week longer. This performance may be done

done easily and safely with only a pair of gloves; though I generally do it without.

382. In order to unite the Bees of a common hive in Autumn with another Stock, by means of one of my constructed straw hives, it will be necessary to measure the common hive bottom, to know whether it will stand within the compass of one of my wooden tops; if it will not, a wooden top similar to mine, but wider, must be made on purpose. Near the close of the evening take one of the wooden tops, with the sliders therein, and place it upon some support close behind the Stock, which must immediately be lifted thereon, and the door-way stopped; then take it to an out-house darkened, and turn it upside down upon a chair frame, tub, or the like; be careful in the turning to keep your left-hand steady upon the board, to prevent its slipping, and with your right-hand turn the hive. It will be proper for young beginners to tie the board down first. Be mindful also, that you turn the side in which the sliders *enter*, upwards, as they may otherwise slip out, and permit the Bees to escape, and vent their fury on you. As soon as turned upside down, set one of my straw hives (with its top and straw cover fastened on) over it, then withdraw the sliders, tie a cloth round the joining, and drive the Bees (372). This being done, set them upon a hive floor, and let them remain there until night, when being removed to the Stock you wish to join them with, thrust the sliders in at top, sprinkle

M 3 them

them with sugar'd ale, and stop the door-way; then take the straw cover off, and immediately lifting the Stock up, put it over them, and either then, or the next night, set them thus *doubled* upon their proper stand. But a still greater security will be to raise the Stock you would drive upon the wooden top, with its sliders in, the night before the removal, at which time the door-way must be stopped, leaving only a small chasm for air; this prevents the possibility of a single Bee's hurting the operator; so that a child, had it strength sufficient, might do it with ease. This mode I esteem the most perfect of any, and capable of being brought into the most general use.

383. I now proceed to give a minute and *certain* method of finding and capturing the Queen; since, (as I have already observed) Mr. Wildman's first method has often failed us.

384. Having drove the Bees out of a Stock into an empty hive (372), let a clean and spacious board or table be in readiness, as also a spoon and two or three pieces of stick, about half an inch thick. Set the empty hive on the table or board, with its edge resting on these sticks, and near the further end of the table; then inverting the hive that has the Bees in it, set it upon a stool close to the table, and take up a spoonful of Bees at a time, first from the largest cluster, and turn them leisurely out upon the table, but so as not to hurt or crush them. They will presently spread so that you may easily see if the Queen
be

be among them; be as quick with your eyes as possible, and if not in that spoonful, strike the Bees under the empty hive; then proceed with another spoonful in the same manner, until you observe the Queen, whom you must immediately seize between your finger and thumb, and put into a small box with holes in it, with some of the workers for company. But if after spooning all out, you should have missed her, look upon the ground, as she may have fallen down, and you may have trod on her. If she be not found, you must repeat the operation, for among such a multitude, it will be very easy to over-look her. If it is a Stock that has been drove to take away the young Princesses, in order to prevent swarming, according to Mr. Wildman, the whole of the Bees must nicely be examined, because there may be three, four, or more Princesses; all of which are to be taken away. What Bees are scattered about may be taken up by the spoon, and returned to the rest; or if the window be set open, they will fly to their usual abode; or if an empty hive be set near them, and a room darkened, they will presently assemble in the hive.

385. It should always be carefully observed, that in turning up and holding a hive in order to drive the Bees the *edges* of the combs should be next you, otherwise the flat sides of the combs will be inclined to each other, and being very heavy the strokes will loosen them, and they will fall against each other, and crush many of the Bees to death, perchance the Queen herself, and thus ruin the Stock.

386. It is very possible for a Stock to be taken up at the critical moment, when the Queen is gone out for air or recreation, therefore on driving no Queen will be found; but she may return afterwards, or even before the operation of driving is finished. This circumstance sometimes occasions the experiment to prove fallacious.

387. A less tedious method of forcing a Swarm is, to set the Stock in its proper place after having drove a sufficiency of Bees into a hive; and let these remain: if both are quiet and work, they have each a Queen; if not, beat the Swarm out by the side of the Stock, or set it upside down with its edge even with the rising board, and they will re-join the Stock. Try again some days after.

388. But the following is a much readier and easier way, by means of hives or boxes constructed upon my plan. In the morning thrust in the sliders to the Stock you would Swarm, take off the cover, and set over it an empty hive, with its door-way stopped; withdraw the sliders, and let them thus remain until about mid-day; then setting a stool, or the like, near the back of the Stock, lift it thereon, immediately stopping the door-way with a rag; carry it to some distance, and with two sticks drum or beat against it, until by your ear you find there are a competent number in the upper hive, or if a box, you may see by the window. Again put the in sliders, let them stand about half an hour, when, if both are quiet, the Stock should be taken to its usual place, and

and the Swarm remain until night. But if you have not succeeded, put the Swarm over the Stock again, and try six or eight days after.

389. But if Bees must be *drove* to form an *artificial Swarm*, I shall prefer the Rev. Mr. Thorly's method, which he recommends for *uniting*; but which, with little variation, is much better adapted to our present purpose.

390. This is done by a narcotic fumigation, produced from the *fungus maximus*, or larger mushroom, variously known by the name of burt, punkist, frogcheese, puffballs, or mully-puffs. These are of various sizes, and some as large as a man's head: they are not fit for the purpose until ripe, at which time they turn brown, and are light; but if so ripe as to have the inside turned to powder, they are useless.

391. They may be found about autumn, at the time that mushrooms are; and generally on commons and dry grounds. They are to be dried gradually by the fire, or squeezed flat, and put into a paper bag, and then into a slow oven, after the bread is drawn, letting them continue all night. When they will easily catch and retain fire, they are fit for use.

392. With a pair of scissars cut a piece of the punk, as large as a hen's egg (better at first to have too much than too little) and fix it to the end of a small stick, slit for that purpose, and sharpened at the other end, which is to be stuck into the inside top of an inverted empty hive, so that the slit end of the stick may reach as high as the middle: the hive is then to be put into a pail or bucket near the Stock you want to swarm.

393. This

393. This done, set fire to the punk with a candle, and immediately place the Stock of Bees over it, tying a cloth (which you must have in readiness) round the joinings, so that no smoke may come forth. In a few minutes time you may hear them drop like hail into the empty hive. When the major part are down, and you hear very few fall, beat the top of the hive gently with your hand, to get as many more out as you can; then loosing the cloth lift the hive on a table or broad board, and knocking the hive against it several times many more will tumble out, perhaps the Queen among them; as she often falls one of the last. If she be not there, search for her among the main body in the other hive, putting them out upon the table; for the Bees will be quite senseless, and you may handle them as you please.

They will continue so but a short time, therefore, having taken all the Queens out, put as many Bees and a Queen as will be sufficient to form a good Swarm into an empty hive, stop up the door-way, and place it as the greatest distance; put the rest and another Queen into the Stock, which set in its place again. The next morning unstop the door of the Swarm, and destroy the superfluous Queens; which will effectually prevent the Stock from casting.

394. But as all these processes of forcing a Swarm is like forcing a man and his family to quit both houses and treasure, which can scarcely ever be done without a great deal of trouble; permit me to accommodate mat-

ters,

ters, and propose a more gentle method of leading them imperceptibly to do what you would have them, without any violence. Not that it shall always be *more certain* than any of the foregoing, but as it can be performed with the greatest facility, and is at the same time void of all danger or damage, both to the Operator and to the Bees, should it not succeed, no harm is done, and but a trifle of time lost.

395. To do this with common hives, have ready an empty one, and two pieces of wood, about two inches broad, and long enough to lay across the hive that is to be moved; if one end of each of these pieces be cut circular, they will be better adapted to extend to the edge of the hive. Have also in readiness a bucket, pail, or pan; or what is still better, an old hive with the top cut off. On either of these place the Stock hive, that is full of Bees, and ready for swarming, upside down; and immediately set the empty hive over them; then lift them thus doubled on the stand again. This must be done soon after dark, and with a pair of gloves on.

The next evening, the Bees being then quiet and reconciled, the joinings must be closed with tempered clay, or other plaistering, leaving only the usual door-way, to which a resting board must also be fixed.

396. This little disturbance, if there be a perfect Swarm ready; that is, a competent number of Bees with a Queen and Drones; will cause them in a day or two either to rise and swarm, or ascend into the upper hive,

hive, and there remain a separate Swarm both working cordially together and going in and out at the same door-way. Thus they are to remain until a little before the usual time of taking honey.

397. They are then to be separated at night, (605) carrying the upper hive to a stand at the greatest distance. If the next day either of the Stocks seem tumultuous and discontented, that hive must be raised about half an inch: for being without a Queen, they will otherwise return to the other hive. Near the close of the evening take it to some out-house, drum out the Bees that remain, and take the honey and wax for your pains. On the contrary, if when separated the Bees of both hives are peaceable, and work as usual, you may preserve either the Swarm or Stock according as they are for goodness.

398. This business, however, may be conducted with still more ease and certainty, by using hives or boxes of my construction. First, having thrust in the sliders over the Stock (in the day-time) take off the cover, then set on the empty hive, and withdraw the sliders; let both door-ways be open. This should be done as soon as the Stock becomes populous. When you find both hives are well filled (467, 586) in the middle of the day put in the sliders; and if the Bees both above and below work as before, it is a sign that there is a separate Swarm in the upper hive, which at night should be taken off, and placed as far from the Stock as it conveniently

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ly can be; then fasten on the cover of the Stock, and withdraw the sliders.

399. But should either hive shew discontent, and there appear a great throng or croud about the door-way of the hive, it indicates that there is no Queen in the upper; and therefore the sliders must be taken out, and the hives remain as they are, until more favourable symptoms appear, when the experiment may be again repeated. However, a careful eye must be kept over them, for after this alarm, though they may not choose to separate and ascend into the upper hive, yet they may all of a sudden take it into their heads to swarm out, either on that day or the next.

400. As the whole of this operation is exceedingly easy and simple, a child may perform it; and should it not happen to succeed, there is nothing to regret, nor any thing lost.

401. Regard must be had to this circumstance of a separate Swarm, whenever you separate double hives; for if the Bees, after some time spent in driving, do not seem at all inclined to relinquish their hive, it is most probable the top one is a separate Swarm. Therefore, if such a one is wanted to be kept, leave off driving, and set it in some distant place, and if that day or the next they work peaceably, and there be no extraordinary croud at the door-way of the old Stock, there is no doubt of its being a distinct Swarm.

402. It is a very easy matter to save the Bees of Stocks in common hives, without cruelly destroying them, and may be done thus.

thus. Nearly at the close of the evening take the Stock whose honey you want, drive the Bees out (372), sprinkle them with ale and sugar, and then set them under the Stock to which you would unite them. Let both hives thus remain until the cold weather sets in; then early in the morning, or in the evening, lift the upper hive off, and set it upon a loose floor, close by; when if the greater part of the Bees have not quitted the under hive, turn it up on its side; with its open part as near the door-way of the Stock as possible, and the Bees will gradually quit their unstored hive, and unite with the full one. However, let me here observe, that this business may be much more conveniently done, by means of my open top hives, into which the Bees may be drove, and the Stock set over them, with less trouble than by any other method whatever (382).

403. Having thus given a detail of the manual operations, it will now be requisite to make such observations, as may, perhaps, be of some service in the *application*.

404. Driving of Bees is a very ancient practice, but on account of its seldom succeeding has never come into general use. Butler observes that it was practised in Greece, Sicily, Italy, &c. under three distinct considerations, viz. of exsection, or cutting off part of the combs, in Spring and Autumn, and of driving at Midsummer: all which he esteems unprofitable or pernicious, at least in our climate, whatever it might be in those plentiful warmer countries. Nor from Butler's
time

time to this have we any better reasons for approving of it, either for the purposes above-mentioned, or for that of Artificial Swarming.

405. We will first attend to what Mr. Wildman himself urges upon the subject. He acknowledges there is danger of killing the Queen in the operation; and consequently (I will add) the loss of the Stock. With respect to obtaining the Queen, he says, in page 198, "There is an art necessary to perform it, namely, Practice, which I cannot convey to them: nor can be speedily attained; yet, until this art be attained, the destruction of many hives of Bees must be the consequence; as every one will find on their first attempt to perform it." To which let me add, for ever after. Nay, I will put it home to Mr. Wildman's own bosom, whether, notwithstanding his frequent practice of driving, he himself does not often ruin a Stock of Bees by the operation? for the Queen is often lost upon the ground, or crushed to death between the edges of the hive, or smothered with the running out of the honey. Many of the commoners are also killed or lost, the combs are loosened, the eggs shaken out, and many of the embryos spoiled by the repeated concussions, and perhaps so chilled for want of their usual warmth during the operation; that the whole or greatest part prove abortive.

406. For by experiments made on my own Stocks, I am fully convinced, that how-

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ever well the process may have been performed, Stocks seldom thrive after it. Whether this be owing to the cause just recited, or to the distress and terror the Bees suffer from the violence, cannot with certainty be determined; but so it is, the Bees never work kindly after it. Neither do I speak this of my own Bees only, for the same ill success attended all of this neighbourhood so treated, that have fallen under my notice; and this in so great a degree, that instead of benefiting the publick, it has more firmly riveted the people to their old burning custom; so that they now abhor the very idea of further improvements.

407. But supposing the method had *so far* been eligible, there are still greater objections against it, as being attended with a great deal of trouble and time; and when done, may probably prove to be labour lost: for as there are no *certain* signs to indicate the precise time of a Stock's being ready to swarm, the operation may consequently be attempted before there are Drones or Queens ready; in which case it must be repeated, perhaps several times: a sport I believe few country-people will be brought to delight in, unless the Bees, like flies, had no stings, and there was nothing to fear, nor more to do, than to turn up the hive, and seize the Queen, as Mr. Wildman directs, at page 199.

408. We may further object, that although the operation should prove successful, and a complete Swarm be obtained thereby; yet the *chief* benefit for which the practice is designed

designed (viz. to save the trouble of watching the rising of the Swarms) is not answered; because the births of the Princesses are very uncertain both with respect to time and numbers. Although you take out all the royal brood cells which you perceive at the time of driving, yet there may be some you can neither see nor come at, or others may be built afterwards. Swarms may therefore afterwards rise with some of the Princesses, without being perceived (as no watch will be kept) and may not only be lost, but what is still worse, the Stock will thereby be so impoverished, as most probably to perish before the next year's honey gathering.

409. From the whole I think we may safely infer, that it will be much better to lull them asleep by a dose of Thorley's soporiferous fume (389), from which no damage can arise either to the Queen or the other Bees; tho' how far the brood may be injured I cannot say. This operation will not take more time than the other, and a small quantity of fume does the business. I have tried the fume arising from many sorts of gum resin, and other drugs, none of which would either kill or stupify the Bees, except the fume of sulphur.

This however is certain and total destruction if there is sufficient of it to pervade the whole hive for a few minutes; but in a less quantity, many of the Bees will recover when exposed to the air again, while others perhaps may escape being affected at all, and be able as soon as

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the hive is lifted up, to revenge the death of their friends. Gunpowder in half an ounce made damp, and managed as directed for wasps (671), will have the same effect on Bees: but the combs and Bees are greatly discoloured thereby; therefore of the two a sulphur rag is preferable.

410. But to return and make short of the matter, I can see no good reason for forcing of Swarms at all: let me ask what are the advantages? If to keep the Bees constantly and wholly at work, this may be done by doubling, that is, adding an empty hive to them as soon as they have occasion (480, 484). If to save the expence and trouble of watching them in swarming-time be the object? this I acknowledge would be of some advantage, could the operation be easily done, and terminated successfully; but this we have shewn is not the case. The expence of hiring a child to watch cannot exceed ten shillings in any year, in most perhaps not half; what person who has a dozen or more hives would grudge so trifling a sum? and where there are fewer Stocks, and out of the view of the family, can it be prudent to risk the destruction of some of these few Stocks by the operation, for the sake of so small a saving, when the preservation of a single Swarm will amply repay it?

411. Besides, in a large Apiary, it will be a very arduous task to drive a great many Stocks; and some of them most likely two or three times over. To this may be added, "the very great risque of destroying the
Queens,

"Queen, which is of the utmost importance, "for the least injury done to her brings immediate destruction to the hive."* How can it be thought that country people can spare those hours of attention; can support that anxiety and care; and acquire that dexterity, to be gained only by a course of many years experience;† which are Mr. Wildman's instruments of witchcraft in these operations; unless, like him, they had nothing else to do?

412. We have estimated the expence of watching at ten shillings, but ought we not to balance against this the labour and trouble of driving in the Artificial way? I believe no one would do that business under sixpence a time, and estimating this only once to a Stock, will take off one half; but as it may be required to be repeated two or three times, it may arise to as much, if not more, than watching; not to mention that after all this expence there is a great chance of losing after-swarms: for, relying upon what has been done, no attention will be given to prevent it. The most plausible argument in favour of this practice is, that it is necessary when Stocks will not swarm in due time; but what then? If they be doubled, no harm can possibly arise; they certainly best know their own condition, and there may be many impediments to swarming beyond the reach of our inspection. What good will coercion do?

* T. Wildman on the Management of Bees, 199.

† Ibid. 201.

do? Had we not better *lead* them gently, according to their own propensities, than to risk their ruin and our own reverfionary profit, by irritating them by our violence? In large but their habitations, and fo far from being indolent, they will labour with the moft anxious and unremitting affiduity to replenish their hives, as far as nature's bounty can fupply, and make you a prefent profit of a hive or two of virgin honey; and the next year a large and early Swarm: thus amply recompencing your forbearance and care.

413. After all, both from Mr. Wildman's own acknowledgment, as well as from what we have related of the matter, it appears that the danger and difficulty, muft render the practice wholly unfit to be generally followed; and though it is now ten years fince it has been introduced, but a very few perfons have adopted it, and feveral of thefe have relinquifhed it from its unfulceffulnefs.

414. Now although we hold driving to be very pernicious to *Stocks* when done for the purpofe of *swarming* them; yet we do not mean that it is fo when performed for the fake of uniting (366) or of feparating hives, which will be treated of hereafter (607); provided that Stock *only* which is to be taken be drove; for *any Stock that is defigned to ftand*, fhould by no means be meddled with, except to raife or to double it; and the lefs difturbance the Bees have the better.

415. However, if any one fhould choofe to swarm the Bees by force, let him always carefully

carefully observe that it must never be attempted until they give very strong signs of being ready for the separation. A calm still day must also be chosen; for turbulent weather discommodes them in their work, and makes them angry and revengeful. The middle of the day, when they are mostly abroad, is likewise to be preferred. For if swarmed, when the greater part are at home, there will be a large Swarm it is true; but the Stock will thereby be too much reduced; and the brood suffering for want of its usual warmth and attendance, will also fail, so that before the next summer, the Stock itself will perish, or be too poor to do any essential service.

416. Before any person attempts to perform this operation, he ought to be well acquainted with the appearance of a Queen Bee. If he has not this piece of knowledge he must acquire it, either by searching for one among such of his neighbours Bees as have been suffocated, or by applying to some experienced person to shew him one. For unless the Apiator can distinguish her at the first glance, it is a hundred to one but she eludes the search, when he attempts the performance; and which happens sometimes to the most experienced, even at a time, when there are two or three Queens in the Stock. Therefore when the Queen is not found, the Bees must be all spooned (376) over again. And if she be not then found, the old Queen has secreted herself
N 3 among

among the combs, and will not quit her post, however long you may drum. (379).

417. Or perhaps, at the critical moment that a Stock is taken, the Queen may be gone out to recreate and air herself, and consequently you must miss her in the hive.

418. That she does so, I once, and only once, had ocular demonstration. One of my Stocks, at the latter end of the summer, had such a prodigious number of Drones, that they consumed, almost all the honey, as fast as the labourers procured it. This I thought shameful, and therefore, was determined to kill great part of these luxurious cormorants, as fast as they appeared at the the door-way. At this time, there was a large number of workers at the door, drumming with their wings, and uttering joyful sounds. Unluckily attempting with my finger to crush a returning Drone, as I thought, though it proved to be the Queen I hurt her, though not mortally, ere I perceived my mistake. She staggered, and was unable to walk. The concourse of Bees that were at the door saw her distress, and were in the utmost consternation; they licked her with their tongues, and used all the little endearments they could to restore her. This continued some minutes. But being still disabled, a number of Bees got under her, and carried her upon their backs into the hive.

420. I was not without my fears for the event, as supposing she would die with the injury: However, the next day, the Bees worked

worked with the same alacrity as usual; consequently the Queen recovered.

421. From this instance I conjecture, that the Queen often makes an excursion in fine weather, accompanied with a great retinue. At this time also numbers croud the door, drumming with their wings, and the whole hive seems full of joy. I had observed this circumstance many times before; but never suspected the reason of it until then; and no doubt others have observed the same. My own avocations are too numerous to spare the necessary time for such minute and close investigations as to ascertain whether it be upon the above account or not, that the Bees appear in that unusual manner. Perhaps some ingenious Bee virtuoso, who is blest with sufficient leisure to make the necessary observations, will be able to clear up this point.

422. But to return to our subject. When a sufficiency of Bees to form a Swarm are driven out of, a Stock, observe whether there be any royal cells sealed up; if there are, set the Stock in its place again, tho' there should be on Queen; for as there soon will be one, the Bees in that expectation will go on with their works. And the Swarm may be set in some other place; without the trouble of turning them out, to search for a Queen: unless you want a spare Queen for any particular purpose, either of use or curiosity.

423. But if it appears that there is no royal brood, set the Stock in its place, and minutely
N 4 examine

examine all the drove Bees, and take out all the Queens. If only two are found, put one to the old Stock, and the other to the Swarm, should there be more than two, select the two largest; the others may be reserved, with a few Drones, in a little box with holes, laying a little honey on the top for their subsistence; or if they be put in a glass vessel, and watched, you may perhaps be entertained with the consummation of the royal nuptial. A most surprizingly rare sight! We cannot, however, dismiss this subject without shewing how to fix a Swarm to any place you wish.

424. Let it be remarked, and it is very wonderful, that such wild, ferocious, and revengeful insects as Bees, shall by a few minutes confinement, and smartly beating upon their hive, be divested of all their courage and ferocity; and become so tame, as to suffer themselves to be taken up in the hand, without discovering the least resentment, unless you hurt them. For when they have been taken off the stand, carried to some distance, confined by means of a cloth or another hive placed over them, and the hive has been briskly drummed upon for a short space, their panic and terror is so great, that you may do as you please with them. In consequence of which, the Queen is then to be searched for, and when found, is to be put into a little box which you should have ready for that purpose. Then take her into a close room, cut off one of her wings, which will prevent

prevent her escaping, tie the fore part of her body round with a silk thread, so as not to injure her; or rather put her into a very small bag of crape, catgut, or other like open materials; pin it to your hat, cap, or any thing else you would choose, and lay it down close to the Swarm. The Bees will soon gather round her, and remain there until they die, if you do not remove them.

425. Thus several Swarms, driven out of as many distinct Stocks, and confined with their respective Queens, may be fixed upon different parts; as one upon the head, one upon the shoulders, and another upon the chin; by tying a small bandage with the Queen fastened to it, to each particular part. Or, by the same device may be fixed to a pole, and carried where-ever you please. By a strong shake of the head, they may immediately be dislodged therefrom if the Queen has been placed there without confinement, having only a wing clipped. Or they may be taken off with a spoon. If a Queen be taken away and concealed from a Swarm, near a window that is open, the Bees will presently fly into the air; but by placing the Queen again in their view they will presently return. This will appear to have been done by a word of command, to persons unacquainted with the secret.

426. But these are merely tricks, that tend more to destroy, than improve Bees; and is besides so very distressful a scene, that no true lover of these very useful insects can practice
practice

practice it without regret, and therefore I shall enlarge no further upon it.

427. Though I have said Bees by driving are made very tractable, yet, let me apprise you, that however nimbly the introductory part, viz. that of taking the hive off the stand, and setting it on another, or on a cloth, may be done, some Bees will inevitable escape, and be apt to sting you. Therefore a young beginner should always put on a safe-guard, especially if he has not been familiar with the Bees before. I generally do it with only a pair of thick leather gloves on.

428. Before I close this chapter, I cannot refrain from addressing myself to those who will not be persuaded to their own good, but will obstinately pursue the old destructive method of suffocating their Bees; imagining that "by destroying them they may have" the greater increase, a notion as void of sense, as it is of truth, unless we could verify Virgil's mode of raising Bees from a dead carcass. We should think it the highest absurdity and cruelty in a king to say, in order to multiply my people, I will find means every year, to have many thousands of them cut off.

Let my intreaties prevail on such to practice the method I have proposed (395, 402). It is not more expensive, and requires but little trouble; who that has a spark of common sense, or common humanity would
grudge

grudge that, for the preservation of so many thousands of useful and industrious insects? Was the *Supreme Being*, to treat us as the country people treat their Bees, how wretched would be the state of human nature!

429. Dames and good women, I conjure you by all that is good and praise-worthy, not to destroy your Bees, lest you yourselves suffer in some future situations. After having read this book, you cannot plead ignorance, but must for ever remain inexcusable.

CHAPTER XIII.

Particular Instructions how to manage Glasses of various Figures, and in different Arrangements, as well for Entertainment as Emolument.

430. **T**HE inimitable works of these wonderful insects have in all ages engaged the attention, not only of the naturalist and philosopher, but also of every person endowed with the least spark of genius, or spirit of enquiry. To gratify so laudable a curiosity, we will now proceed to exhibit to the inquisitive, the several methods of obtaining a more perfect inspection of their extraordinary works and oeconomy.

431. But let it be premised, that the use of glasses, is not wholly restricted to *amusement*; they are of real use, by enabling
us

us to take honey from the Bees, when in its greatest perfection. The fashion and arrangement of glasses for the above purposes depends, indeed, more upon fancy, than any precise rules. We shall, however, describe such as we think the most eligible.

432. That kind of glass globe, which is made use of for street lamps, will do as well as any, and is easily procurable; the open part, we shall call the bottom. It should hold about a peck; for, if bigger, it cannot in many situations be filled in time. A stick of a proper length, must be placed upright in the middle of the globe, with holes near the upper part, to receive two other small cross sticks, to keep it steady; that the Bees may the better fix their combs therein. In some places, globes may be had with a hole at the top, on purpose to receive the stick, which is to be fastened over the top by a small peg. If the inside of the globe be previously rubbed with wax, so as to roughen it, the Bees will be greatly assisted in crawling up.

433. The floor on which it is to stand, must have a bevil or slant cut out, three inches wide, and descending from the middle to the edge, which must be left very thin; by this means, when the globe is set on, there will be a free passage for the Bees, at this part under the edge of the glass; directly under which, the deepening should not be above three-eighths of an inch.

434. The

434. The first large Swarm that rises, is to be put into this globe instead of a hive. There should be Bees enough nearly to fill it; but if not, add a Cast (366) to them afterwards. For if your situation should not be a very plentiful one, or the summer should prove unfavourable, a small quantity of Bees will not be able to fill the globe, and a box beside, which they should do; for they cannot be kept in the glass, through the winter, without perishing. The globe is then to be set in a Bee-house, and a cloth or some other convenient covering must be placed over the glass, to keep the light from the Bees; for otherwise, *that*, and the novelty of their habitation, will be so disgustful to them, that they will be apt to quit it.

A piece of empty honey-comb, (if virgin the better) placed previously in the glass, (493) will the sooner reconcile them to it; and if in two or three days afterwards, they have begun to work, there will be no danger of their deserting it.

435. When they have nearly filled the globe, or seem to want more room, raise the glass upon another hive or box (480). In about four or five weeks after, if the season has been favourable, the brood will be all in the under hive or box; and the globe, filled with honey and wax, may be taken off for the owner's profit.

436. But after the first week of July, whether they have filled the globe or not, they must be raised on a box, that they may begin
to

to work therein for their winter store. About a month after, take the globe off at night, and the next morning turn it up, and tap the sides with your fingers, until the Bees have quitted, and left it to your disposal. If they do not readily come out by tapping, blow now and then among them with a bellows, which will hasten their exit.

437. Another method is, by setting a globe *over* a strong Stock, as soon as honey gathering commences (480, 484). But as the bottom of the globe being circular, will not extend over the openings of the box or hive; therefore, before you set it on, place in the sliders, then setting the globe on, lay pieces of tea chest lead (that from the bohea chests, as being thickest, will be best) tin, tile, or clay over the openings, which may extend beyond the circle of the bottom of the globe, at the same time raising the edge of the globe in front near half an inch by two pieces of stick, at three inches distance from each other, for a door-way for the Bees; the rest of the raised part, stop with clay, or cow dung. Then withdrawing the sliders, the Bees will ascend, but the sooner if a piece or two of a comb be previously fixed in it (434). The door-way of the Stock must also be stopped, in order to compel them to pass out only from the middle. The bottom door way must however be opened three or four days after they have begun to work in the globe, and then the middle, or globe door-way must be stopped up, that the Queen may

Glass Vessels, for the Bees to work in. 191

may be prevented from depositing any of her eggs in that. By this means, the globe will be filled with *intire* virgin honey and wax, and should be taken off as soon as it is so (480).

438. But the most minute, as well as the most comprehensive view of the Bees and their operations, is to be obtained by causing a Swarm to work in several distinct glasses without any hive at all. For this purpose, procure seven three-pint glass vessels of any form you please. Glasses, however, in the form of a flower beaker, (fig. 13.) without top or bottom, and not above eight inches high, will not only make the best appearance, but will likewise support such pieces of empty combs, as are to be placed in the upper part, to a great nicety, without any other contrivance than circular pieces of plain glass cut out so as to cover the tops; or, if another range of glasses are desired to be set over these; pieces of rattan or mahogany wood may be substituted, either with circular holes, or slits, as most agreeable. (The beaker form I would recommend as the most eligible for all glasses that are to be set over Bee-hives, or boxes, to those persons who purchase Bee glasses on purpose).

439. A board or frame must then be prepared of the proper dimensions for these glasses to stand on, with their mouths, or open ends downward. The circles made by the glasses being marked, four or five circular holes, each about three quarters of an inch diameter

192 *Glass Vessels for the Bees to work in,*

ter, or slits half an inch wide, are to be made within each circle, over which the glasses are to stand. This board or frame must be raised an inch, by nailing a broad hoop round it; or if square, by nailing on fillets of wood, observing to cut out a proper passage for the Bees in the front fillet. The whole apparatus should also have a bottom, or floor to stand on.

440. A portion of fine virgin comb must be placed in each glass, so as to extend from one side to the other. Small slips of combs on each side of the other, will preserve it from falling when the Bees first ascend, and when the work is compleated, appear the hand-somer.

441. The apparatus being thus in readiness, and every glass set in its place, let the first large early Swarm you have, be hived as usual; but if not a large one, add a Cast afterwards (366). As soon as the Swarm is hived, take them to some out-house, catch the Queen (384), cut off one of her wings, (as otherwise she will not stay) and put her into one of the glasses, (turned with its mouth upwards); and with a spoon, as soon as possible, put in as many Bees to her as you conveniently can, and then turn it down upon its place over the board. The rest of the Swarm is by spoonfuls at a time to be forced under the board; which, if raised a little, will admit them the more easily, and they will soon ascend into the glasses. At night, set the glasses down close to the floor again,

again, and put the whole into the Bee-house; or if designed to stand in a room in the dwelling-house, the direction of (135) is to be observed.

442. When the glasses appear nearly full, or the Bees seem to want room, they are to be raised on a box hive. But, as the dimensions of the frame, on which the glasses stand, may be too large for the top of the box, to obviate this difficulty, four pieces of wood must be nailed, or dove-tailed together, so as to leave an opening of the same diameter as the top of the box. But the pieces must be sufficiently broad to rest upon, and likewise extend beyond the edges of the box, far enough for the frame to stand upon. Lay this square on the box, and in the evening, lift up the frame and glasses, from the floor, and set them upon the square, that has been previously laid over the box.

443. If the frame will not readily part from the floor, by reason of combs fixed thereto, they must be previously loosened, by a long and very thin knife; or a sheet of tin thrust under it. The next morning, the passage or door-way of the frame must be stopped, to oblige the Bees to pass only through that of the box.

444. As fast as the brood are hatched, and the vacant cells filled with honey, the glasses are to be successively taken off, by sliding a piece of tin under each; then nimbly taking the glass to some distance, turn it up, and tap about the sides with your fingers,

194 *Glass Vessels for the Bees to work in.*

gers, and in a little time the Bees will quit it, without offering you any injury.

445. But should they not be filled in time (615, &c.) they must nevertheless be taken off, one or two in a day, that the Bees may be compelled to begin their works in the box. If any of the glasses should have a considerable brood in them, cut out as much of the combs as have honey in them as you can, and fix those parts that have brood in them into the glasses again, until they are hatched. Or the whole may be kept to work without a box until honey-gathering be over. In this case, as fast as any glasses appear full of honey, and without brood, they should be taken off, and empty ones put in their place; but as soon as honey fails, *every* glass that is full, and without brood, must be taken away at night, and the others are to be set over another Stock.

446. When all the glasses are off, put in the sliders of the box, and draw it a little away from the front, raising the frame about half an inch; at night you may safely take it off; perhaps there may be many Bees in it, and it may also be full of combs; set it upon its edge by the side of the box, and by morning the Bees will have left it; if not, drive them out. Let it be observed, however, that little pieces of tin, tea-chest lead, tile, or wood should be ready, to cover the holes with when the glasses are taken off.

447. By this process the Bees being compelled to work in *several* divisions, thereby afford the most conspicuous *view* of all their operations,

operations, and in a far superior degree than when in larger bodies; for then being very much crowded by numbers, and inclosed by combs, little satisfaction can be obtained, and the inquisitive mind must be greatly disappointed. Not that this contrivance, or indeed any other of boxes with sliding frames, drawers, or surrounded with glass windows can possibly give a view of the *Queen* as often as the owner pleases, or as Mr. Wildman seems to promise; for if there be but a *single comb* in a division, the *Queen* will *not be seen* but when she deposits an egg; at all other times she is surrounded and veiled from our sight by her numerous retinue.

448. Upon the above plan, a pyramid of glasses may be so arranged as to form a beautiful encampment of these wonderful insect warriors. Boards must likewise be provided, of suitable dimensions, to lay between each range of glasses, and corresponding holes made in them; that the Bees may pass freely through, from the lower to the upper.

449. Another way is to have a glass circle or hoop, without either top or bottom; over this a board perforated with proper holes is to be placed, on which another glass of less dimensions may be put, and still smaller glasses round that: indeed there are many other contrivances of this kind, that an ingenious fancy may devise, and to which we can fix no limits: the whole, as may be supposed, from the expence attending them, are designed

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only as elegant exhibitions for persons of fortune.

450. However, it must be remarked, that the number of the Bees is to be in proportion to the number and bulk of the glasses, and also to the height of the ascent; for glasses more than one story high two good Swarms will be required, making together about half a bushel. Nor must the excessive labour it will cost these industrious insects in these slippery tenements be forgotten; and therefore to shorten their task, no glasses should be above seven or eight inches high; otherwise, multitudes will die of the toil, nor will the Stock be worth any thing the next year.

451. With respect to taking off the glasses, this is to be performed in the same manner as the preceding. The whole should be taken off the first week in July, and drove together in an empty box, when the Bees having time enough before them, will be enabled to fill it. Or if left until autumn, the Queen must be taken from them; and if very numerous, the Bees must be divided, and united to other Stocks.

452. We now descend to describe a more humble, though much more useful plan, viz. that of setting only one range of glasses upon a box or hive; by which we may be enabled to draw the honey from the Bees at the critical time, when the most aromatic flowers, that yield the finest honey, are in perfection.

453. There are glasses to be had in London, blown purposely of several sizes; these

these are globular in the upper part, but contract towards the bottom. This figure I suppose is adapted to secure the combs from falling out, and at the same time to form a more pleasing spectacle. As to the first intention, it is perfectly needless in such small vessels, as the Bees will fix their combs so as to require no such support; while the globular contracted form of the glass gives the combs an inconvenient shape, and renders them incapable of being taken out, without being previously cut. Common tumblers are preferable to these, but the beaker form (fig. 13) as before observed, is by far the most convenient.

454. Norought any of these to be less than half a pint, for I have often observed, that in smaller vessels the Bees waste a great deal of time and labour, by not having sufficient room to work in, crouding too much uponeachother, so that many, when they are got therein, are obliged to return back again with their loads.

455. Before the glasses are set on a box hive, or the cover taken off, the sliders must be put in. Then having in readines pieces of tea-chest lead, adapted to cover any openings that might appear, set on the glasses, and having covered all the crevices with the lead, keep it tight by small stones or pieces of lead thereon; but where lead cannot be easily come at (though every considerable tea-dealer can furnish it) pieces of tin will do. All being now secur-ed, so that no Bee can get out at the top, withdraw the sliders, and cover the glasses with a cloth or the like. But where glasses

198 *Glass Vessels for the Bees to work in.*

are set on a straw hive, and not in a house, the circular part of another straw hive, without a top, is to be placed as a circle round the glasses, and a pan to cover the whole; both of which may be lifted up at pleasure, and the glasses viewed with as much ease and safety (standing at the back of the hive) as with boxes in a house. It is best to set the glasses on near the close of the evening.

460. Each of the glasses must have a piece of empty comb, placed across the top; without this inticement it will be a long while before the Bees will ascend to work in them, and oftentimes not at all; but with this, they will begin the very day. Every year, portions of fine comb should be reserved for this purpose, carefully wrapped up in paper, and placed where they may be kept dry, and no moth get at them.

461. As soon as the glasses are filled with combs, and these with honey, (which you may know by the cells being nearly all sealed or covered over with wax) they are to be taken off, and empty ones placed in their stead. The nice point now consists in determining the quantity that can safely be taken away; for otherwise you may take so much and so long, as to leave the Bees no time to store their hive sufficiently to support them through the dreary season of winter. Regard here is to be had to the strength of your Stock and the goodness of the season. In situations where Stocks usually afford a hive of honey (beside their own) about that quantity may be drawn

drawn from them. Where profit only is intended, confection glasses of two quarts each will be best; a single glass may be set on first; if they seem eager in filling it, it indicates plenty of pasturage, and you may then venture to set on more. Also, when there are honey dews, they should be fully supplied with glasses. When they seem too much crowded in the bottom hive, it shews they have not room enough in the top, and more or larger vessels must be furnished them, else they will either lie out or swarm. About the middle of July the honey in general begins to fail, therefore the glasses must be all taken off; likewise whenever the Bees slacken their work in them, the same method must be pursued; for if kept on longer, *they will begin to feed on the honey that is in the glasses.* When combs that have honey in them, are put into glasses the Bees will eagerly ascend, and carry away all the honey, and then under a foolish mistake begin to work, and refill the cells again.

462. Observe also, that no glasses are to be set on a Stock that is intended to swarm; nor over any that you purpose to take; as it will prevent the Bees from filling an under hive.

463. Some seasons are so unfavourable for honey, that no Stocks will bear drawing, without being too much impoverished thereby; besides which, attention must be paid to such Stocks as being much more numerous in Bees than others, will fill several glasses, while others shall not be able to fill one. No

discriminating rules can be given for every case, something must be left to discretion, and to observation formed upon practice. Bees will much readier fill glasses set over them, than by the side or collateral.

464. Instead of glasses, either where these are not to be had, or where curiosity is not the motive, old cracked mugs or pans may be substituted, and will sufficiently answer the purpose.

465. By this method we acquire more perfectly, with more ease, and without running any risque, all the advantages intended by the frequent shifting of hives, so much extolled by some authors; and this moreover without giving any disturbance, or doing any injury to the Bees. At the same time you are enabled to indulge in the pleasing contemplations, and to examine at leisure with what assiduity and sagacity these our diminutive servants effect works of so much wisdom and utility.

CHAPTER XIV.

The METHOD and TIME of RAISING or DOUBLING HIVES and STOCKS.

466. **I**T has already been observed (282) that Stocks should be double hived when they begin to lie out. We now add, that

that they are likewise to be so when you wish any particular Stock not to swarm; as also, when they shew signs of being too much crouded, and want an enlargement of their habitation. Lastly, Stocks that have not swarmed by a certain time, must be supplied with an additional hive.

467. By the term *Raising* Stocks, is generally meant the operation of setting an empty hive under a full one, or upon lifts or ekeings. While by that of *Doubling*, we mean the adding an empty hive to a full one, by placing it under, or at its side.

468. Before we proceed further, it will be highly proper to be able to judge of the fullness of a hive, in order to its being doubled, especially of such as are without windows. This may be tolerably well ascertained, by attentively observing in the day-time the croud going in and out of the hive. If the croud be constantly greater than formerly, the number of the Bees has most assuredly been considerably increased. Some share, however, of experience is here absolutely necessary, as that alone can enable us to determine with the requisite precision: therefore, as another, and indeed by no means an inconsiderable help, strike the sides of the hive with your fist in the evening; and if it be full of Bees you will hear a great buz all through the hive; but if partially filled, the buz will seem to come mostly from the middle. The hive also, if full of combs and honey, will feel tight

tight and solid to the stroke; whereas if there be only a few combs, it will seem hollow, both in sound, and to the touch.

469. When numbers of Bees are observed to play idly about the entrance of the hive, while others keep drumming with their wings; and if at the same time the hive feels heavy; it is a certain sign that the Bees want more room, either for themselves or their honey; and the Stock must therefore be immediately doubled. For it is likely they cannot swarm, either for want of a Princess or of Drones, and therefore being inactive at a time when there is most honey to be got, the most precious part of the season will be lost, in waiting longer for their swarming. Nay, if the situation and season be very good, a Swarm may still rise notwithstanding the doubling.

470. No Stock should be raised*, until replenished with Bees; which in some years is not until the latter end of June or middle of July; and should they then continue scanty and feel light, such must *not* be doubled at all, unless you first add a Swarm or Cast to strengthen them.

The greater the number of Bees in the spring, and the heavier the hives, from the number of combs, the sooner the Stocks will want doubling. This may be done in such case in May, or if the spring be very early in April.

471. Such

* We shall use the terms Doubling or Raising as synonymous, when applicable to the collateral or story method.

471. Such Swarms of the preceding year as are populous and weighty, will be the fittest to set glasses or small vessels on instead of doubling; for these will be good Stocks for the next year.

472. It has employed much time and ingenious contrivance to prevent the Queen's breeding in the old hive or box, after a fresh empty one has been added to it. But in some seasons she *will* do this whatever methods may be taken, either in the collateral method, or that of raising. This I have several years experienced; but especially in the year 1779, I observed that of old Stocks which had been raised three stories, and all of which were well filled, the *two* uppermost hives had broods in them when taken even in the autumn.

473. From hence I infer, that next to glasses or small vessels, the surest way of obtaining the greatest number of *intire virgin* hives, will be to place empty hives *over* half of those Stocks which were last year's Swarms, and are now in proper condition, while the other half may be *raised*, or stand to swarm. By this management these Stocks will work themselves down into the *under* hives, and thus form fresh Stocks for next year, and are then to have empty hives placed *over* them in their turn; while the others are at the same time to be raised, as being then of two years standing. Thus they are to be changed alternately, year after year, furnishing a large quantity of fine honey and wax, and at the

at the same time also preventing any of your hives standing more than two years; longer than which no Stocks should be suffered at any rate to continue in one hive; for after that period the combs become black and filthy; many of the cells choaked up with old and useless farina; and the whole hive pestered with moths and other insects, often to the intire destruction of the Stock. To prevent mistakes, the stands should be all numbered, and a register kept of the age of each Stock.

474. Never let any of the Stocks want room, for that will teach the Bees to be idle. They sometimes require enlargement very suddenly; for by a large delivery of young in the space of a few hours, the hive will become too much crowded; which will probably occasion a sudden and unexpected Swarm to rise.

475. The Stocks of the last season that appear strong, and which you intend to *raise*, may remain *single* until the Swarm be out; for if raised before, it may prevent swarming, or else retard it until too late. But should any of the Bees lie out more than three or four days (281), rouze them from their beginning inactivity by raising them.

476. But if you have Stocks enough already, and therefore do not want Swarms, set an empty hive under them as soon as ever they either seem crowded, work briskly, or the weather be enticing.

477. The

477. The same thing must also be done to all Stocks that are two years old and upwards; for they will by these means be frequently prevented from swarming; and consequently there will be the greater chance of their quitting their old tenement and filling the new under one in time.

478. The raising of Bees has been directed by Mr. Wildman, and other writers, to be done in the day-time: this I have found a very troublesome and disagreeable task, and not to be executed without receiving some stings, unless properly covered. Boxes with sliders that stand in houses, are however to be excepted, because the Bees do not see the aggressor before the operation is over.

479. But to do it with straw hives without giving offence to the Bees, and with the greatest ease to the operator, the evening, when it is but just light enough to see how to place your instruments, is a much properer time; or a clear star or moon-light night will be still better. It may be done however late at night by the light of a candle and lantern, brought no nearer than is absolutely necessary, which is better than in the close of the evening; for the later this business is executed, the more quiet and sleepy are the Bees, and, before they are much alarmed, the operation will be over.

480. The method of doing it is this; set close to the Stock a stool, chair-frame, or the like, so that it may stand firm; have ready an empty
hive

hive with its cover off, and also a hive floor. Lift up the Stock, floor and all, very gently, put it upon the stool, and place the empty hive and floor upon the stand; the Stock must then be lifted up from its floor, and set over the empty hive. The floor with the loose Bees on it, must be placed and supported, so that the edge may touch the door-way of the Stock, or at least the edge of its floor. Many Bees will oftentimes be left on it; but they will join their companions before morning. However, if there be any danger of rain, they must be secured therefrom by a proper covering. A pair of gloves is all the defence necessary for this operation.

481. Where hives have not a *moveable floor*, this operation will be more troublesome to perform, and some of the Bees will be killed, by setting the empty hive over the loose ones that remain on the stand after the Stock is lifted off, and set upon the stool. When the empty hive is in its place, the Stock is then again to be lifted up, and put upon it. Thus for want of the advantage of a moveable floor, the Stock undergoes a double removal and disturbance.

482. Early in the morning, examine if you have set the hives right; the upper door way upon a line with the bottom one. If there be any openings, slip pieces of tin or tea-chest lead over them, and plaister them and the joinings with clay, or any other proper substance.

483. But

483. But observe this *general rule*, do no more at the time of any operation than is absolutely necessary. It is always best if the Bees insult you, to go from them for a little while, and then return and do a little more. By this gentle mode of proceeding, you will accomplish it with ease and safety, and without any breach of friendship.

484. When an empty hive is to be set over a Stock, you have only to shove in the sliders of the latter, take off the cover, then set the empty hive over, and withdraw the sliders. This may be done with very little risk in the day time; but at night there is no hazard of receiving even a single sting.

485. As the variation in joining collateral boxes, consists only in introducing the sliders into the sides instead of the tops, there needs no farther explanation. Whenever a hive or box be set *under* another, keep both door-ways open for some days: this eases the Bees of the unnecessary labour of climbing up the empty hive with their burdens, perhaps for weeks, before the upper one is so full as to induce them to work in the under. But should they not in two or three days work out at both door-ways, shut the upper one, by which means, they will become acquainted with the bottom entrance. In a few days after, open the upper one, and they will continue to pass out of both; and if they are then nearly in want of room, or if there be plenty of honey to gather, it will compel them to work in the under hive;
and

and they will do this the sooner, in proportion to the ease with which they can either ascend or descend. And not only much time and fatigue will be saved by this management, but the hives will be also much sooner filled. A consideration which ought to be of great weight with the owner. Nor is this all: for by adding a hive early, with the middle door-way open, the Bees are in no wise hindered, and whenever so disposed, will descend without any care or attendance of the Apiator.

486. Here it may be proper to observe, that if a good Stock or Swarm be purchased about swarming-time, it should be set on an empty box or hive, ready placed with its door-way shut, until the Bees be well acquainted with their new situation.

487. In collateral boxes, both door-ways may be left open when first doubled; which should be early. The Queen, having then room enough in one box, will not be tempted to move into the other, until more combs are wanted, for her continually increasing family. Therefore, about the middle of the honey harvest, or the first week in July; due regard, however, being had to the nature of the season; stop up the door-way of that box, which is intended to be taken for the honey. The Queen will cease, in general, to deposit her eggs therein, and the Bees will have sufficient time to fill the brood-cells with honey, as fast as they become empty.

488. The

488. The ingenious Madam Vicat, a Swiss lady, who has favoured the world with some sensible remarks; and also an experienced writer, under the signature of a *Lover of Bees*,* which may be found in the appendix to Mr. Wildman's treatise; have from their experiments concluded, that Bees will not ascend to work in an *upper hive*, unless late in the season, and when they have neither swarmed, nor have any hopes of a Princess. Want of room will then oblige them to ascend, but if a Princess be bred, they will rather swarm than do it.

489. These observations are in general true; and while the Bees are confined to the passage of the bottom hive *only*, and with so few, and such limited openings, as they seem to have been in the experiments made by connoisseurs, the same result will almost always be observed. But with more enlarged, and better disposed communications, and with a *proper management of the door-ways*, in the manner above described, the Bees will act differently, induced by the great facility with which they can accomplish their designs.

490. Glass, in particular, is very disagreeable to Bees, and so unlike any habitations they are used to, that nothing but necessity,

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or

* *Whose method of setting one box before another, had been tried before Worlidge's time, and was found unsuccessful.*

or the strong temptation of a comb, previously placed in it, will intice them to build therein.

491. Neither must it be concluded, because some Stocks cannot by any management whatever be induced to work in an upper hive, that therefore it is from aversion. For they may have a sufficiency of room already. To which may be also added, that some years, and some situations, may be so bad, as not to yield a supply sufficient to fill two boxes: or the Bees may not be sufficiently numerous to perform so much work. Under such circumstances as these, it will be in vain to expect the Bees to work, either in an under or upper box: and therefore the failure cannot with any propriety or shadow of reasoning, be attributed to the scheme or mode of management; unless you can suppose the author pretends to instruct you how to command the seasons also!

492. The better to elucidate this point, permit me to recite an experiment, which I have frequently repeated. This consisted in placing an empty box hive over one with a Stock in it, after previously fixing in some pieces combs, filled with honey, by way of decoy: The Bees always ascended immediately, and with the greatest avidity eat up or carried away all the honey, under a supposition, that it was placed there for that very purpose, or might be soon taken away again. But finding afterwards, that the combs remained, they began to refill the cells; and gradually
added

added others until they had filled the box. While in other boxes without decoys, they have only raised some combs, upwards between the bars, without constructing any at the top, or filling the box.

493. Some years ago I had a *small* box, the top of which had the usual number of holes. In May the Bees seeming to want room, another box was set over it, and the lower door-ways stopped. The Bees on this entered in at the upper passage, and went through the holes into the under box without discovering the least inclination to work in the upper one, although at the same time there was such plenty of honey pasture as occasioned them to cast out a great number of their brood to make room for their honey. Provoked at this, I took the empty box off, (a perilous task with such boxes) and inverting the full one, set the empty one over it, bottom to bottom, without any bars between. This at once hit their fancy; they presently not only extended their combs upwards, but also began combs at the top of the upper box, working them downwards, so that the upper and under combs met, though not in right lines; the whole forming a curious and grotesque appearance. Nor have I ever since found that by setting boxes over others that had holes in them, after the common manner, or communicated with each other by partial openings only, the Bees could be induced to work in the additional box.

494. But where bars have been used, if the season has been good, they have seldom disappointed me. It may be proper here to relate a remarkable instance of two Swarms, each of which when hived, being too numerous for one of my straw hives, many of the Bees were forced to lie out. Empty hives were then set over each of the Swarms; and during the summer they half filled these with the purest honey and wax.

495. These examples prove incontestibly the propriety and advantages of bars, over any other constructions; the reason seems to be this, the openings between the bars coincide so well with those between the combs, that the Bees meeting with no obstacle to their ascent, are deceived into a notion that the two boxes are but one; and therefore carry on their works without hesitation. Happy for us, if many of the false notions among men proved as beneficial.

496. Bees that are kept in common straw hives, are often obliged to be idle for want of room, greatly to the owner's disadvantage. To remedy this, such Stocks as are weighty and seem full of Bees, and that have not swarmed by the middle of July, or by the time the black-berries begin to blow (for seasons and situations must be allowed for) especially if the weather has been fine; such Stocks I say should be turned upside down, and empty hives placed over them (493). The Bees being in this unnatural position, will more readily go into the empty hive, than if they had been

been set over it in the common way. This will generally be the case; but it must be allowed that sometimes neither one way nor the other will succeed. Therefore after they have been doubled a few days, it will be proper to try how matters stand, by striking the upper hive with your fist in the evening, when the Bees are all at home. If a large quantity of them have fixed themselves in it, you will hear a considerable buz; but if this be not the case, fix in another empty hive a comb with honey in it; and at night take the other empty hive off, and place this in its stead: inticed by the honey-comb, they will soon ascend and begin to work.

497. Another way is to turn an empty hive upside down, and near the bottom cut an opening sufficient to form a proper door-way, to which fix an alighting-board; lay the usual bars across the top, and at night set the full hive over it; and either then, or early the next morning, block up the other door-ways, and plaster the joining all round, so that no Bee can come out, but at the new bottom entrance. This will answer better, as being more agreeable to their usual stile of building; but after they have stood thus a few days, in order to shorten the toil of the Bees crawling up the empty hive, open a middle door-way; and if they then work at both passages, it is a sure indication that they have begun to make combs in the under hive. By this management they are continually kept employed to their master's advantage; and

214 *To Raise or Double Stocks.*

not only so, but when the hives come to be separated, the bottom one may probably contain a Swarm, and be reserved as a Stock for next year (398).

498. Who that possesses but a small portion of humanity, and has the example of these industrious creatures continually before his eyes, will not pluck from his bosom the hand of slothfulness, and perform this kind office, as well to encrease his own store, as at the same time to save the innocent and deserving insects from the murdering match!

499. A less advantageous method is pursued by some country-people; these use what they call an *ekeing* or *lift*; consisting of three or four rounds of another hive, the edges of which are made even, and sewed down with packthread. The full hive is raised on these, to give them more room. This practice is attended with many inconveniences, and often proves insufficient for the intended purpose; and therefore it is best to raise them at once, as before directed (480), especially as it may be equally, if not more easily performed. When it is observed that the Bees in the spring season do not carry in farina, it is to be apprehended that the Queen is dead. If so, as soon as their honey is consumed, and often before if honey pasture be commenced, they will relinquish their own hive, taking with them what honey may be left, and unite with some of the other Stocks, occasioning thereby an unusual

unusual cronding at the door-way of such Stock, as though invaded by robbing Bees; or as if they were going to swarm. When such circumstances appear, the *Queenless* Stock should at night be set over some other (480, 484).

500. To those who have glass windows in their hives or boxes, it may be of some use to know, that when Bees begin to work in a hive, they construct the rudiments of several combs at once: and to accomplish this with the greatest ease and expedition, a part of the Bees are formed into as many distinct ranges, hanging down from the top like so many chains, by which those that are to fashion the combs, ascend and descend. If the number of Bees be very great, they hang close and thick, like so many curtains; but if not many in number, few only can be spared for this purpose; therefore they then form chains of single Bees, linked to each other by the claws, the bottom Bee keeping the whole link steady by clinging fast to the floor; but this being a hard task, it holds it but a few minutes, and then it gives place to another. In the evening they draw up to the top in a close cluster, to take their necessary repose.

501. When therefore a Swarm has been hived, or a Stock doubled, and the Bees hang down as above described, it is a sure sign that they have begun to form some combs therein; or if it be a doubled Stock that has not swarmed, there is no danger that it will, if honey-pasture be plentiful, until the additional hive

be nearly filled. In straw hives that have no windows, by gently lifting them up behind, a peep may be had without danger.

502. There have been instances of such very hot summers as to melt the honey, and soften the combs so much as to ruin the Stocks. The summer of 1779, had in some places this effect: in such cases shelter the hives as much as possible, by mats, bags, long straw, or branches of trees, and also raise the hives half an inch or more, to admit the air. In bee houses set all the doors open, and frequently water the ground about the hives.

503. In all extensive Apiaries, it will be useful to keep two or three Stocks in boxes, as serving for indexes or standards, indicating the state or success of all the other Stocks. The windows affording a proper and sufficient inspection for acquiring such information.

CHAPTER XV.

Of the PASTURAGE or FLOWERS proper for BEES; with a Catalogue of them, and Observations thereon; also, of the proper Number of STOCKS requisite for different Situations.

504. **H**OWEVER skilfully Bees may be managed, the profits arising therefrom must in a great measure depend upon the goodness

goodness of the situation for pasturage; or in other words, upon the quantity of such flowers as will yield the greatest plenty of fine honey, and of farina for the sustenance of the brood.

505. Bees under very indifferent management, where a profusion of food can be speedily acquired, will succeed *better* than others under the most *skillful*, can possibly do, where bee-flowers are soon exhausted, or are inconsiderable in quantity, or at too great a distance.

506. On the other hand, in a bad situation, and with bad management, they will produce but a trifling advantage; and should a few untoward seasons succeed each other, they will be reduced to nothing. To these united causes is owing that scantiness of Bees observable almost in every county of this kingdom, some particular heaths and commons excepted. For as these are generally skirted by woods, and as woods, heaths, and commons hardly ever suffer from the ravages of the unsparring scythe, the Bee-flowers are left untouched. Particularly favourable are such commons as are thickly covered with mole-hills, on which the wild thyme spreads its aromatic sweets; but pleasing to the Bees alone; to sheep and other cattle unsavory, and by them unheeded.

507. Where heath or broom abound the collections of honey are very large; these plants continuing very long and late in bloom, often

often to November; but though the *quantity* of honey be very considerable, yet its *quality* is very ordinary; perhaps there is none worse, except that acquired from buckwheat, which also furnishes a profusion.

508. Honey collected from gardens, is in England generally superior to any other; as these afford more aromatic and sweeter flowers than either fields or woods; but then the quantity is very small compared to the other.

509. It is an error, however, to suppose that the Bees gather from all sweet flowers, indiscriminately: so far from it, they are very nice in their choice, and entirely reject those we most esteem. The choicest productions of the flower gardens, as roses, pinks, hyacinths, auriculas, sweet-williams, stocks, honey-suckles, jessamines, and many others of gorgeous and varied hues, as well as highly fragrant odours, are all as useless pageants to our Bees, unworthy their least regard: while flowers of little or no apparent beauty, and so minute as to appear to us scarce worthy of notice, furnish to them the choicest stores, and the richest repasts.

510. But where a choice is denied them, like the poor among mankind, they are compelled to feed on coarser diet: nay, instances are upon record of their collecting from noxious plants, highly prejudicial to health. The large wild Bees indeed collect from all sorts of flowers; but their honey is despicable.

511. The

511. The following catalogue of flowers, contains those *only* that I have observed the Bees to visit with any considerable attention. They are arranged according to the succession of blowing, except that several blow at the same time, and many of them vary according to the time of sowing or planting.

512. Winter Aconite, Laurustinus, Snow Drops*, Hazel, Crocuses*, Sallows, Oziers, Primroses, Violets, Standard Almonds, single Wall-Flowers*, Apricots, Peaches; Nectarines, Plumbs, Cherries, Pears, Turneps*, all the class of Brassica or Cabbages, Coleworts, * &c. Gooseberries, Dwarf Almonds, Rosemary,** Apples, Strawberries, Tulips, May or White Thorn, Heath,* Gols, or Furze, Star of Bethlehem, Borage**, Raspberries*, Laburnum, Columbine, Barberries, Beans*, Syringoes, Sweet Briar, Mustard, Tares*, Clover, Spiked Star of Bethlehem, Cucumbers, Greek Valerian, Bladder Sena, French Willows*, Thyme**, White Poppies, Mignonette**, Blackberries, Lime Tree, Hyssop*, Garden Fennel*, Nasturtium, Ladies Fingers*, Cats Tails, Sainfoin, Buckwheat*, Maples, Alders, Sweet Scabius, Sunflowers, Spanish Broom, Starwort, Michaelmas Daisies, Winter Savory, Passion Flower, Jacob's Beard, and the larger Ivy.

513. Those articles marked with a * are such as produce the greatest quantity of honey or farina; and those with ** such as afford honey of the highest perfection.

514. If

514. If this last was deposited by the Bees in cells by itself, it would be in the highest request and of great value; but as honey from inferior flowers is collected at the same time, both sorts are mingled together, and form an aggregate in quality, proportionate to that diversity: therefore, glasses set over boxes or hives, at the critical time, that is, when the choicest flowers bloom, seem the most eligible method of collecting the most of it as perfect as it can be obtained.

515. Of the flowers here enumerated some furnish farina, and others honey; and some both. Farina is gathered very *early* in the spring, as soon as the Bees begin to breed, and is continued to be collected until autumn; whereas in general the honey-harvest does not begin until late in the spring, and is over early in the autumn or before.

516. Farina is that simple dust or flour found on the stamina of flowers, and varies in colour according to the bloom from which it is collected; but in general it is yellow. This the Bees brush off, and form into little balls, and fix into little cavities of their legs, and carry into their hives, to feed the brood with, while in the maggot state. This is commonly thought to be wax, but it is not so; nor has it any of the properties of wax; neither can it by any art that we are acquainted with be converted into a waxy substance. After many repeated boilings it will not assimilate either with the wax or the water.

water. Besides, was it wax a Swarm would collect most of it when they were first put into a hive; the reverse of which is evident, for then they are seen to carry hardly any; whereas in the spring, when a Stock can want no wax, they are seen to carry in the largest quantity of farina.

517. The country-people have given it the appellation of *Bee-bread*; they might rather call it brood-bread; for there is no proof from any of the observations that have been made respecting this substance, that the Bees feed upon it themselves. It is most probable that the Bees swallow this substance, and concoct it in their own stomachs in some degree, and then feed the Bee-maggots therewith. Its proper name is *farina*; and to prevent injurious misconceptions of it in practice, we shall constantly call it by that name.

518. The winter aconite is the first blossom that furnishes this farina; the snow-drop and crocus follow: after these the fallows, especially the white fallow, which will be cloathed with blossoms so replete with this yellow dust, that the Bees will cluster so thick upon them, as might induce one to think a Swarm was going to settle there. Many of these near an Apiary, must be greatly serviceable, as will also plenty of crocuses and snow-drops; as also *single* wall-flowers.

The whole class of cabbages, favoys, brocoli, &c. if let run to seed, or to sprouts, will afford very seasonable supply, when the bloom of other plants becomes scarce. Turneps,

neps are useful. Almonds afford a moderate quantity of farina; gooseberries yield more, and raspberries exceed both.

519. The fruit trees afford honey of a good quality, so do beans, but not in great quantity; vetches or tares, and buckwheat yield it in great plenty; so does clover, but the white forms the best honey. Heath and broom furnish very large quantities, when hardly any other flowers are left. Spanish broom is much extolled by Bradley; but if the Bees can find honey in other flowers, this will be wholly neglected. Rosemary blows early and holds long, and is perhaps the first aromatic plant that supplies the Bees with honey, and that of a fine quality.

520. But the two most favourite Bee-plants for honey are lemon-thyme, and borage. Lemon-thyme continues to bloom a considerable while, and furnishes a most delicious honey, for colour and fluidity like mountain-wine. Large quantities of it may be planted for edgings, as well in the kitchen garden and pleasure ground, as in the flower division. It takes up but little room, if properly trimmed once a year.

521. This elegant plant forms a pleasing ever-green edging all the year; but when in bloom the slight purple hue of its flower, contrasted with its green and yellowish foliage, attracts the eye, while the organ of smell is regaled, and the senses enlivened by its aromatic odours. At the same time the jocund Bees humming their joyful songs, rove from flower

flower to flower through every walk, and excite the most pleasing sensation in a mind blessed with sympathetic sensibility.

522. But of all plants *Borage* seems most devoted to the service of the Bees, both on account of its long continuance in bloom, and the excellent quality of its honey. It well deserves the significant epithet of *Bee-Flower*.

523. It may be managed so as to flower from early spring to November, if no frost of consequence should intervene. It affords plenty of seeds, and if these be sown at different periods in any soil, the plants may be raised so as to be in successive bloom as long as the weather will permit the Bees to collect their honey. From this plant they will gather at all times, even when the atmosphere is so wet or cold as to deprive all other flowers of their honeyed sweets. But these plants should be confined to a particular spot; for shedding their seed very fast, when once in the ground it will be difficult to exterminate them. Those sown by hand, or self-sown, when come up must be thinned by an hoe in the same manner as turneps, to make them blow the stronger.

524. *Mignonette* is another Bee-flower, but as I was not acquainted with it, as such, until this year, I cannot determine as to the quality of its honey: the Bees seem as fond of it as of borage, and will gather from it as long. It may also be continued in bloom until the latter end of November, by sowing it at different

different times; therefore, if the compass of ground allotted for the Bee stands be sown with this or borage, and proper path-ways made, it would be of singular benefit to the Bees, and afford no small pleasure to the spectator; especially if an edging of lemon-thyme be added, and the extreme circumference planted with rosemary.

525. I have been lately informed of a flower which grows on the borders of Hertfordshire and Cambridgeshire, about Barkway and Royston, and is there called *Cats-tails*. It is found once in three years, according to the labouring-people, from whom I have received this intelligence, in very great plenty, and furnishes a prodigious quantity of honey, tho' a very troublesome weed to the farmer. This plant, however, is not confined to those parts, for I have since heard of it in the fields about this part of the country, though too late for me to profit by the information. The best description I can procure of it at present is, that from the root many round stalks arise, which ascend higher than the corn: these stalks are rough, hairy, and in a small degree prickly, and beset with brownish spots from top to bottom. The leaves are narrow like wall-flowers, and are placed single one above another at small distances on each side of the stalks, and are of a pale green. The stalks are furnished with branches all the way up, which are about two inches in length, and closely set with flower-buds; these decreasing gradually towards the end resemble a cat's
tail

tail. The flower-buds, at their first appearance, are of a purplish colour, but afterwards, when expanded, of a pale purple or blue; and are nearly funnel-shaped, with a purple thrum. It blows in June, and, I suppose, is annual. From its producing so large a quantity of flowers in succession, it would seem to be a valuable plant for the Bees.

526. Perhaps, there may be a variety of green-house plants very acceptable to Bees; but as these are confined to gentlemen's seats, we pass them over as not being of general use.

527. There are several flowers mentioned by some authors, which are omitted in my catalogue; because I could not perceive the domestic Bees take any notice of them; notwithstanding some of them derive their appellations from the Bees, as mellilot, apium, honey-wort, melissa or baulm, &c.

528. Lavender and baulm, though apparently excellent Bee-flowers, were to my surprise generally neglected, or visited but very sparingly by the Bees.

529. The autumnal star-wort, or Michaelmas daisy, are serviceable Bee-flowers. That species, however, stiled by Millar* the Italian blue, and which he tells us is the *Amellus* of Virgil,

* *Gardener's Folio Dictionary, Cistus.*

Virgil, does not seem to answer to Virgil's description :

“ The flower itself is glorious to behold,
 “ And shines on altars like refulgent gold.”

DRYDEN'S VIRGIL.

An honour much too glorious for so mean a flower.

The root boiled in generous wine is what Virgil prescribes to restore sick Bees. I believe it has no such virtue ; but as the falernian wine elevated Virgil to sing immortal songs, it may probably have a cordial effect on the Bees. Good English ale, a liquor Virgil never tasted, will however prove more salutary.

It is very likely that a difference of climates, as well as of seasons, may occasion a very considerable difference in the nature and disposition of flowers for yielding honey.

For it may be remarked, that though in some years the Bees will collect from sweet-briars, May, or white thorn, Greek valerian, honesty, or lunaria, and some others ; yet in other seasons they will not be seen to touch them. This may arise from the peculiarity of the weather, as to heat or cold, moist or dry, at the blooming-time of the above flowers. In a very wet or very dry season, flowers yield no honey. If the former happens while the best flowers are blowing, the Bees must collect from very inferior ones, as their choice is then limited. They will be nearly in the same dilemma when there is a long succession
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of very hot weather: for though the honey collected at the first opening of the blossoms is excellent, yet the heat causes these to dry and fall off so soon that the quantity is very small.

530. Instances are very common of less honey being collected (in some situations) than was sufficient to support any Stock through the winter: much less to afford any surplus to the owner (571).

531. The cistus labdanum hath its leaves covered with a clammy kind of gum, from whence I was induced to hope it might furnish the Bees with *Wax*; but they never applied to it for that purpose; the flowers indeed they sometimes gathered from, though but seldom. Nor could I ever observe them to collect any thing from laurels, pines, or firs; though some writers have asserted that they collect their wax from those trees.

532. The great Boerhaave mentions their gathering wax from the rosemary leaves. I have many of these plants about my Apiary, and have frequently and attentively observed them, but never saw the Bees take any thing from the *leaves*; the *flowers* indeed they were greatly enamoured with, and enriched themselves with their nectar. How, where, or from what they collect the valuable article of wax, seems yet a mystery. I am inclined to think that they suck it from flowers into their stomachs, as they do the honey, and carry it thus into their hives, and then apply it to the intended

tended use, warm and pliable as it comes from that organ. For in places where considerable quantities of white poppies bloom, the combs made at that time are remarkably *white*, and extensive combs will be formed in a much shorter time than usual; nor is this remark wholly my own, several Apiators having noticed the same.

533. When there are large fields of white clover, near an Apiary, and the bloom not cut off, the hives will be filled in a short time.

534. Large woods near a Bee-ground are of very great service: not only on account of the plenty of farina they afford, but also of the honey dews; for there being a great number of trees so near each other, a large quantity of that article is necessarily gathered in a much shorter time than it could be from the same number of trees scattered through the distance of perhaps several miles.

That the nearer and more plentiful all the honey pasture is, the more journies the Bees can make in a day, and consequently collect a larger quantity, is a proposition that seems self-evident.

535. It has been said, that Bees will fly three miles for pasture; be it so; you will not dispute, however, that if they had but three rods or three yards, they would fill your hives much sooner. If Bees will usually fly so far for provender, how comes it to pass that so many Stocks perish for want, when it has been well known that at half a mile distance they might have collected honey in plenty?

or

or how is it that poor Stocks on being removed, not more than that distance, have presently become rich, and filled their hives? I question whether they ever traverse for food in spring or autumn more than a quarter of a mile.

536. In Egypt and other eastern nations, it has been a practice to remove Stocks of Bees in waggons or in boats from one place to another, even to a very great distance. As fast as the flowers fail in one encampment they proceed to another, through the whole season. Something of this nature has been attempted in France, where, perhaps, it may have proved successful; but from the instability of the English climate, the advantage arising from such a scheme here would not be adequate to the expence.

537. Whether it would be eligible to cultivate a field or large spot of ground, with plants purposely for Bees, is at present doubtful, because all the neighbouring Bees, and numberless other insects, would become equal sharers of the provision; but notwithstanding this; if the increase of honey should prove considerably greater than it would otherwise have been, and of more or even equal value with any crop that might have been raised on the ground, it would be a very eligible practice for many farmersto adopt; not only as a valuable change to many pieces of ground, but for the improvement of such as would otherwise from their natural poverty be good for little, and yet might produce a rich crop of Bee-flowers,

viz. Borage, buckwheat, sainfoin, tares, and white clover. Buckwheat is often sown to be afterwards plowed in as manure; but by this management it would be made of double advantage; as might also white clover, by letting it stand for seed, which is valuable and chiefly imported from Holland. Sainfoin and tares may likewise be cultivated for the same purpose, and with a similar advantage; whereby there will be a two-fold crop, one of honey, from the flowers (which must not be cut) and another from the seed.

538. It is referred to the judgment of the experienced, whether the value of the honey and seed would not be more than adequate to that of mowing a particular field or two for fodder. How far this scheme may be generally practicable, I will not determine; but at any rate it cannot be an unprofitable step to appropriate, in large extensive gardens, some poor or mean spots for the cultivation of Bee-plants; for though other Bees will undoubtedly participate, yet from the greater vicinity of the flowers to the Apiary, your own Bees will collect by far the greater share of honey, &c. being enabled by their taking shorter journies, to make much quicker returns; and therefore, though you cannot reap the whole advantage, you will certainly benefit considerably more than if no such provision had been made. Moreover, if the neighbouring Bee-gardens be equally well furnished; the advantage will be mutual, and the
Stocks,

Stocks of the whole circuit abundantly improved.

539. One plant in particular, and to which few people have any dislike, deserves peculiar encouragement, as it affords in the fruit a very agreeable repast for themselves, and in the flowers for the Bees; I mean the *Strawberry*, of which I have many beds; they are raised high and laid oval: no pains are taken with them, but drawing out any weeds that may appear. These plants, though growing in a manner wild, afford as much fruit as those upon which much time and care have been bestowed.

540. One remarkable circumstance remains to be unfolded; which is, that of all the *fruits* raised by us, I know of none except the amber gooseberry, that the Bees will feed on, but of this, when left upon the bushes until dead ripe, they will devour the pulpy part in the same manner as wasps do.

541. When Stocks have had an extraordinary day of honey-gathering, they seem as it were to praise the Deity for his bounty, in a full and joyful chorus, easily distinguishable by attentive Apiators. The same may be observed when they have been so successful as to have filled their hives, great numbers having then no more work to do, are seen to frisk about full of sport and play before their city gates: but the idle and the epicure Drones undergo a sad reverse, a dismal fate; for they must now no longer partake of that delicious food

which others have industriously accumulated with so much toil and labour.

542. Water is absolutely necessary to Bees, but as our climate is generally charged with moisture and dews, there are perhaps but few places that require any water to be set on purpose for them; except in a very dry season; or if there be no pond near the Apiary. In this case the public feeding troughs (760) filled with water, will answer the purpose; or broad shallow pans filled with small rough stones, and the water poured among them: These will enable the Bees to stand and sip, without danger of drowning, which otherwise they would be liable to. Ponds covered with duck-weed are very convenient to the Bees, as these weeds will buoy them up so as to enable them to sip with safety.

543. Let us now endeavour to investigate what number of Stocks may be kept, so as to give the most profit, and from thence draw some inferences with respect to the emoluments accruing to the proprietor.

544. For this purpose a review of what has been said by former writers on this subject, will furnish us with some useful information.

545. Rusden relates, " That on the 21st of
 " June 1677, a colony being weighed, it was
 " fifty-five pounds, and on the 28th of June
 " it weighed eighty-five pounds, which was
 " an increase of thirty pounds in seven days.
 " But in the same space of time a single Stock
 " or Swarm can seldom increase five pounds.
 " The reason is, the colony having but *one*
 " brood

“ brood, can spare most of the working Bees.
“ But the Stock or Swarm having *each* of
“ them a young brood, when the harvest of
“ Honey-Dews comes, they being separate,
“ cannot spare so many labourers, in propor-
“ tion as the colonies; nor have they a suffi-
“ ciency of vacant combs to put the honey
“ in, the chief part being filled with brood.
“ Neither are the colony Bees obliged to go
“ abroad in bad weather; as are the Stocks
“ or Swarms, whereby many are lost.”

546. Rusden's boxes were ten inches high,
and sixteen inches over, on the outside:
“ One of these, (he says) taken from a co-
“ lony generally weighed fifty-six pounds,
“ while Stocks only weigh twenty-eight
“ pounds.” (Here he is certainly mistaken,
I have bought many farmers Stocks, that
have weighed forty-five pounds and up-
wards): but he subjoins, “ Or a Stock that
“ has not swarmed forty pounds. A colony
“ also will have one fifth part more good
“ honey: nor do they put their honey into
“ those cells that have had brood in, as
“ Stocks and Swarms are obliged to do.”

547. “ But supposing the Swarm left as a
“ balance to the worth of the colony (which
“ it doth not near do) then the Stock taken
“ up will not weigh half that of the colony
“ taken off, besides the superior goodness of
“ the honey.”

548. He observes in another place, “ That
“ he took some colonies off that year of fifty-
“ seven pounds, sixty-one, and sixty-four
“ pounds

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“ pounds weight each, so that colonies turn
“ out more than doubly profitable, and have
“ more virgin honey than three straw hives.”
He used three boxes to each colony.*

549. The Reverend Mr. Thorley mentions, that in some summers he has taken two boxes from one colony, each weighing forty pounds, and left store enough in the other for their maintenance (his boxes were ten inches deep in the inside, and the breadth twelve or fourteen inches), discounting therefore ten pounds, for the weight of box and wax, there will be 60lb. left for the proprietor, and the greater part pure virgin honey. This gentleman's son informs us, that in a good season he has had (at Ball's Pond, near Newington-Green) a glass globe filled in thirty days, containing thirty-eight pounds of fine honey.

550. Dr. Warder,† of Croydon, gives us no calculation of the profits of his boxes; but to those who keep Stocks in the usual way, his advice is worthy of remark. In order to become a wealthy Apiator, he advises, “ to
“ begin with ten good Stocks, at ten shillings
“ a Stock (though in some counties they are
“ much

* *The word Colony conveys no idea of a Stock of Bees, that is kept from swarming; but quite the reverse. Much less can we conceive that thereby is only meant a Stock raised three stories high. A Swarm might properly be called a Colony, had they no supreme head; but the instant they are settled, they become an independent empire.*

† *True Amazons,*

“ much cheaper). The first year by doubt
“ ling your Casts, you will be able to have
“ about twenty-five good Stocks, and the next
“ year about sixty, and the third year about
“ one hundred and fifty, barring casualties,
“ and they prove good years; so that when
“ you have raised this Stock, you are rich
“ enough, if not over covetous. Should
“ there come good weather, you may have
“ about one hundred and sixty Stocks to
“ take, which, at five shillings a Stock, good
“ and bad, comes to forty pounds; a good
reward for the pains taken with them.

551. Here the woman with her basket of eggs, spontaneously intrudes upon the mind. This speculation seems the result of the Doctor's calculations in his study; for it is much to be questioned whether such a rapid increase has ever been found in England.

552. However, I think we may safely remark upon the whole, that the situations in which these several gentlemen made these very great profits, must have been of the extraordinary kind; and withal but few or no Apiaries in the vicinity to participate in the pasturage.

553. The professor Wildman has given us no estimates of this kind, and therefore I may proceed to say something of my own Apiary, which could never furnish near such a quantity of honey as above related; nor will my situation support more than eighteen Stocks, and some years not even twelve.

554. It must be a very good year, and a very good Stock, to afford me a box of twenty-five

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five pounds. Nor will the run of Stocks in this neighbourhood yield upon an average above sixteen pounds of honey each.

555. If by raising your Stocks you are so lucky as to keep them from swarming, the number of Bees in each will consequently be very great; and should it prove a favourable season for honey-gathering, a great quantity will be collected in a few days; for as according to the old adage, "Many hands make light work," so two pecks of Bees in one hive, will procure twice the quantity of honey than if the same number of Bees had been divided into two hives. The more Bees together the greater their prosperity.

556. That colonies, or in other words, Story Stocks well conducted, will yield far greater advantage in every respect than common hives, in similar situations, must be readily acknowledged by every judicious person who shall have tried both.

557. But neither Warder nor Rusden have given us any directions for discovering what situations are favourable for this prodigious increase; nor made any allowance for the many deductions that must be made for the loss of Stocks in the winter and spring; nor for those years in which little honey can be obtained; nor for the unavoidable swarming of colonies, notwithstanding every precaution.

558. I am not conversant with heath countries; but it seems improbable, that any of them can possibly allow of such a rapid and prodigiously great increase as Warder supposes. Our climate is too change-
able

able and unfavourable for it. And if we have one good year in three for Bees, it is as much, as upon an average, we can boast of. The mildest of our seasons are checquered with too much variety to be very proper for this nice business: so that it may be safely questioned whether Russia's much severer climate, be not more propitious.

559. In Spring and Summer it frequently happens that the day cloathed in the brightest splendor, and with its genial warmth gladdening the hearts of men and Bees, shall suddenly become cold, wet, and gloomy. In such inauspicious weather the Bees, compelled to stay at home, will quickly consume as much honey as they had laboured for in the preceding fine days. Should these unfavourable transitions be frequent during the honey harvest; especially at the time of the Honey Dews falling, farewell plenty! Want! consuming Want, throughout the winter, will be the portion of these useful and industrious insects; and will inevitably destroy them in the Spring, unless timely relieved by the fostering hand of charity (733, 752).

560. The Reverend Mr. White observes, that the village in which he dwelt, though a large one, would only supply ten colonies; and yet his boxes were less than a peck measure.

This village was surrounded with beautiful meadows and fine gardens. Whereas, in the adjoining county of Cambridge abounding with extensive barren heaths, which allow scarcely any flowers to spring up and blossom; there is such a profusion of honey, that he had seen 70 or 80 hives in one farmers yard, even
just

just after the burning-time. And this, notwithstanding the inundations of the fens, the farmers plough, or the numerous flocks, that graze on those almost barren heaths. To which we may add, that the same circumstances are observable in Hampshire and Wiltshire.

561. The village from which I write has a great affinity to that described by Mr. White: and yet, about a mile from hence, upon the environs of a very extensive common, and skirted with ample woods, Bees thrive amazingly.

562. Marshy grounds are very unfavourable to Bees. I have known some that did not thrive on such, but on being removed about a mile to a higher and drier situation, soon became strong and well replenished.

563. Should several neighbours vie with each other, who shall keep the most hives, it will impoverish the Stocks of all.

But although this may happen to be the case in some few places; yet England is in general very thinly stocked with Bees. Should every farmer and cottager, however, keep a few, all the honey and wax the flowers could possibly yield, would be as regularly collected as the apples of the orchard, or the wheat of the fields; and prove a great advantage to themselves, and the kingdom in general.

564. Most of the cottagers throughout the island, with a very small portion of trouble, and at a very little expence, as has been shewn, provided their Bees be managed properly might half maintain their families by the profits. Many of these labouring people keep poultry: which, though requiring both much
attention

attention and expence, prove but little advantage to themselves, and of great detriment to the farmers. Bees, however, few of them will keep, tho' demanding much less attendance, much less expence, and yet, when properly managed, will yield twenty times the profit. How preposterously absurd is such conduct!

565. Though in some situations very great profits cannot be made: yet in all a profit may be obtained sufficiently adequate to the time and expence bestowed on these industrious servants, by their no less industrious and humane masters and protectors.

566. From the principles laid down, we may infer, that the number of Stocks of Bees must be limited according to the nature of the situation: and that a place or district may be over-stocked in the same manner as pasture for sheep. For if twenty of these be confined to a pasturage that will support but ten, what else but poverty, leanness, and even death can be expected. So, if an Apiator keeps twenty Stocks of Bees, though he finds year after year, many die in winter for want, and the rest but scantily provided; it must be folly, not to take the *hint*, and reduce them in future to half the number.

CHAPTER XVI.

Of HONEY DEWS.

567. **T**HE Honey Dew is not a liquid deposited by the air on the leaves of plants, as is generally supposed: For then, like other dews or fogs, it would fall on, and

and adhere to all sorts of plants indiscriminately; whereas, it is found only on a *few* particular plants; and on them but partially, for the young leaves afford none.

568. The oak, maple, sycamore, hazle, and bramble, are, as far as I can find, the only plants on which it is found. Neither is it discovered like other dews, early in the morning; But some hours after the sun has shone with its greatest splendor, that is about ten or eleven o'clock; and continues, more or fewer hours, in proportion to that splendor. For cloudy, dull days are incompatible with Honey Dews. This substance is as transparent and as sweet as honey, and is in fact, perfect honey, attracted through the pores of the leaves, by a peculiar sultry heat; particularly when reflected through clouds. Sometimes it is found on the leaves in the form of little drops or globules. But at other times being more diluted, by the greater moisture of the atmosphere, it covers the leaves, as though they were spread with a fine syrup.

570. The time in which these Honey Dews are generally found, is from the beginning of June to the middle of July. But it will vary in proportion as the weather is wet or dry; which will occasion them to be either sooner or later. The hottest and driest summers, produce the largest and most frequent Honey Dews. In cold and wet seasons, few or none of them are to be seen. When the year is backward in its fruit, it betokens that the Honey Dews will be late also; sometimes, even so late as the middle of harvest.

571. Butler has a remarkable observation upon this subject; Honey Dews he says, were in the year 1617 produced two months after the usual time. There having been a long continuance of wet weather, no Honey Dews were found until the latter end of August; which proved exceedingly hot. But the quantities were small and of little service. For the Stocks when taken, proved light: and most of the Stocks and Swarms that were kept, died for want, before the end of winter; excepting only in the heath countries; were the heath being then in full flower, afforded the Bees that plenty of honey which could not be obtained from the Honey Dews.

572. Whenever a Honey Dew is found, the Bees are so extremely eager to fetch it, that they quit all other work, that their returns may be the quicker and more numerous; and lest a gloomy change should deprive them of the precious prize. No harvest swain, dreading impending storms, can be more anxious, or expeditious, in hastening the housing of his crops than these aerial tribes in this their delightful office; so much so, that thronging in too great numbers at the door-way, they jostle and tumble each other down. And smarting woe to those who shall thoughtlessly stand in their way at this important crisis. Their joy on these occasions, is expressed in such incessant and loud notes, as to be heard at a great distance. By these tokens it may

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be

be known there is a Honey Dew, without seeing the trees from which they gather it.

573. The Bees of such Apiaries as are far distant from those plants that produce HoneyDews, cannot collect near the quantity that those can that are near. Gardens in particular, seldom furnish plants of this sort.

574. A very surprising source of honey was observed by the Abbé Boffier in France. This he tells us, the Bees collected from the excrement of a small insect called a Puceron, vulgarly a louse, infesting the bark of some particular trees; such as holm-oak and the lime. In the middle of summer they furnish the most of this excrementitious sweet: In the Autum (tho' that is the time the Bees have most need of it) but little, and of inferior quality to honey gathered from flowers.

575. As I was ignorant whether any thing of this kind had ever been noticed in England, and as there are both oak and lime trees on my premises, I have from year to year, very attentively observed them; but could never perceive any such appearances as described by the Abbé; I must therefore leave this matter to be ascertained by some one who shall be more successfully inquisitive.

CHAPTER XVII.

The Method of Separating DOUBLE HIVES or BOXES; and of taking the HONEY-COMBS, and HIVES in general; with many Observations and Precautions relating to STOCKS during the Summer.

576. **H**AVING accommodated the Bees with the most convenient and proper necessities for the growth and preservation of their families, and increase of their treasure, it is but reasonable that as a requital for this trouble and expence, we participate with them in the profit; therefore to shew how to obtain this to the greatest advantage, is our present task.

577. Stocks that have emitted Swarms, in general will not afford an extra box or hive of honey that summer; nor can it be expected from Swarms; unless in both cases the Bees be very numerous (a peck at least), or the seasons and situations very good.

578. The prosperity of a Stock depends much upon the Drones: for if these be deficient in number, or not born until late in the summer, the increase of your Bees will be

proportionably limited : on the contrary, if they be too numerous (418, 580) they will devour the honey so fast that the Workers can hardly keep a *single* hive supplied, much less fill an additional one (830).

579. When the Drones have been too few in a Stock, I have watched their coming out from other Stocks that seemed to have too many ; and taken some of them away with my finger and thumb. I have put a dozen or two of these, having previously cut off one of their wings, or wetted them, to prevent their flight, to a droneless Stock, where they were kindly entertained. The Stock presently afterwards was greatly improved.

580. On the contrary, when they are too numerous, they may be destroyed by the finger laid on them as they rise from the resting-board (582). Great discretion however is necessary, lest too many be killed ; for this will prevent a proper increase of young ; and also the Queen's being sufficiently impregnated to produce a brood the next spring.

581. When their numbers are moderate, the working Bees themselves will destroy them the latter end of July or beginning of August ; according as the season may have been : for about this time honey-gathering failing, and the Queen having no further occasion for their services, a general massacre is ordered ; though sometimes this is not executed all at once, but gradually. Heaps of slain may be seen before some hives, while before others very few, the rest being expelled.

This

This only protracts their fate a few days, when famine, inexorable famine, terminates their existence. At this fatal period the Workers keep guard at the door-way, that none may re-enter their once blissful habitations.

582. Sometimes it happens, though the instances are but few, that the Drones are so very numerous that either the other Bees would not, or could not attempt any violence against them; in consequence of which so much honey is devoured in autumn as to impoverish the Stock, and occasion its destruction.

583. To remedy this evil, when the other Stocks kill their Drones, quietly place yourself by the side of the door-way, in the middle of a fine day, and crush every Drone with your finger as they pass out or in. By this means a great number may be killed in a short time; but it must be done without flurry or hurting any of the Workers; for should this be done, though by chance, it will enrage them so much that it will be best to leave them a while, and to resume the task an hour or two afterwards. Or a piece of wood may be fixed before the door-way, and a part of its bottom edge cut out deep enough to admit the Workers, but not the Drones: those that happen then to be out must remain so. In the evening, the working Bees being all within the hives, the Drones that are without side may be easily destroyed. The board must then be taken away, and re-fixed in the course of the next day, and in the evening

the same operation is to be repeated. Two or three times will probably be sufficient to destroy the whole; or, at least, so lessen their numbers as to give the working Bees a great superiority, and encourage them to destroy the now useless Drones.

584. But in general the killing a few by the hand, will excite the Workers to finish the cruel but necessary business. Sometimes the separating of double hives will have the same effect; the disturbance putting them in a passion, they will vent it upon the defenceless Drones.

585. Those Stocks that soonest expel their Drones, will increase greatly in honey, and be the boldest and strongest in defending themselves against all their enemies: and also generally produce the earliest Swarms.

586. It being now time to reap the reward of all our care and patience, it becomes necessary to give such information as will enable the Apiator to know when a straw-hive is full, and fit to be taken. To judge of this, strike in the evening with your fingers all round upon the hive; if at the first or second stroke a great noise is made, and continued for a considerable time, you may be sure it is full of Bees; and if upon striking all round the hive, and near the bottom, it feels solid to your strokes, you may conclude it is also full of honey: on the contrary, if it sounds hollow, it is not full, and must remain longer, or even until honey-gathering be over. When the Bees on striking make but little noise, and
that

that only for a short time, it shews there are but few; nevertheless if it has signs of being full of honey, it should undoubtedly be taken; for if permitted to stand, it may be assaulted by robbers in the autumn, or the Bees may perish by cold in the winter.

587. When a box is placed under another, and some combs are made therein, the Queen commonly ceases to lay her eggs in the upper, and begins to deposit them in the under box; about three weeks after which time the upper story will be destitute of brood. It is not however to be then taken, because time must be given for the Bees to fill the vacant cells with honey; and also, nearly to fill the under box for their winter store: otherwise, the upper full one being taken away, should the honey harvest presently fail, the Stock will be left unprovided, and must perish through famine before the next season.

588. But the Queen will continue often to lay both in an under and upper box or hive; being very unwilling to leave her old familiarized apartment. When hives therefore are taken with brood in them, great circumspection must be used in separating those parts of the combs that have brood; these must be put into an empty hive, and placed over or under the Stock, as may appear most convenient. In boxes or hives with windows, it may be known in which of them the Queen is, by introducing the sliders as soon as an additional one becomes full. Leave them an hour or two, in which time, if

either of the boxes have not a Queen, the Bees of that Box will be in the utmost hurry and confusion: but if there happens to be a Queen in each, the Bees of both boxes will be quiet, and the additional one may be taken off and kept as a Swarm. If there be only one Queen, and she in the old bottom hive, stop up the door-way, and withdraw the sliders, which will induce her to ascend, and make the upper one her residence; but for greater certainty stop the bottom door-way, when a box is first set on; this will not give the Bees any extraordinary labour; for their way will be as short down into the box, as up by the door-way. If after all she is still in the old box at taking-time, drive the Bees into an empty hive, and setting the door-way of that against the door-way of the virgin box, they will unite without further trouble.

590. I have taken at the latter end of August, both the under and upper hives of a Stock that had been raised three stories, which yet had brood and farina in both, the upper and under door-way being left open; and the same in other years, though the upper door-way was closed up. Therefore such large straw hives as have been raised, had better be left until the usual time of taking, as then there will be the less risk of their having brood.

591. The separation of hives or boxes, when stored with honey-combs, is the most difficult part in the management of Bees. This has given me no little perplexity for several

several years; as I endeavoured to find out a method, not only of performing this very difficult operation with ease, but also with little or no additional expence. After a variety of experiments, however, I was successful enough to hit upon three methods of operating, all of them sufficiently practicable, and which I here offer to my reader's choice.

592. The implements used in the first method are, a double tin-plate made sixteen inches long and sixteen broad, by having a slip neatly soldered on, and as even and smooth as possible; one end of it should be turned over a wire that it may not hurt the hand, when shoved between the hives. Or milled iron, of the thickness of the tin, may do. Also, two saws, of about four or five inches wide, which are elastic, and at the same time of a proper substance for our purpose, without casting. A cloth to throw over the hive, an empty hive, and also a chair-frame, pail, tub, or the like; should all be in readiness.

593. If it be a hive or box that is to be taken off, just after dark, stop all the doorways and thrust in the sliders to the under hive; then shove the tin-plate between the upper and lower hive, as gently as possible, and if it is not in a house, keep your left hand in the front, to prevent the hives from sliding out of their place. Thrust the saws under the plate, one on each side, until the edges are even with those of the tin. Lift up the whole together, at the same time extending

tending your fingers as much as possible under the saws, to keep them close up to the tin both before and behind in order to prevent its casting, or being hollow: which it will do without the saws, and thereby would let the enraged Bees out, in great numbers, greatly to your and their prejudice, all which the saws prevent.

594. As soon as it is taken off, set it leisurely upon a board or hive floor, and take it to some out-house; then turn it upside down, upon a pail, &c. floors tin and saws altogether, without loosening them in the turning; take off the board with one hand, at the same instant extending your other hand over the saws and tin to keep them close down, until you have placed an empty hive with the door-way previously stopped over it. Keep them steady while you withdraw the saws, then holding your left hand firm upon the hive with the other drum about four or five minutes, then take away the tin, and drum again until you hear by the buz that the greater part are ascended. There is some nicety in the management of the saws, but a little practice will make it very easy: and what is more, not a Bee can come out to hurt you. Tho' on perusal this may seem tedious and difficult, yet I have felt more difficulty in giving this description than in the performance itself.

595. If there be any brood in the combs, these are to be cut out, and so placed in an empty hive, which has bars or openings, that
when

when the hive is inverted the combs may lean slanting against the sides, and not flat against each other. The hive is then to be placed over the Stock. If there be any fragments of combs or honey upon the top of the Stock, they must be scraped off first, and then the sliders withdrawn. But when there is no occasion to set a hive over the Stock the cover is to be fastened on before the sliders are taken out.

596. When a hive is taken off, it should not be carried near the dwelling-house, for the next day the Bees will come in great numbers to search for their stolen treasure, and be very troublesome visitors; many of them will be also lost in the pursuit.

597. This operation may be performed in the day-time; but the Bees that are returning home, seeing the disturbance, will become close enquirers of what is doing; as will also those of the other stands, so that one or two Stocks will be the most any one can possibly manage without being armed cap-a-pée. Boxes in a house, may however be taken by day-light without much inconvenience.

598. In order to render the saws unnecessary, plates both of iron and pewter have been tried; but to preserve their evenness or level when used, they were obliged to be made so thick, that on introducing them between the hives, the Bees were greatly more enraged, and at the same time had ample opportunity of issuing out upon the Apiator.

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The tin-plate, being so thin, readily cuts its way and separates the combs with greater nicety and with less umbrage, than can be done by a knife or any other instrument; at the same time confining the Bees as it passes.

599. If a bar three inches wide be fixed in the middle of the bottoms of the hives, corresponding to the middle bar of the tops; it will render the tin-plate unnecessary; for the saws, when thrust in at the sides, will reach to the bar, and thereby close the whole bottom up. But that end of the bar that is to be next the door-way, must be spread dove-tail ways, and be bevilled down to a feather edge, otherwise it will stop up the door-way.

600. My second mode of separation is performed by a thin wainscot board; which must not be thicker than a quarter of an inch. It is to be of the same dimensions as the tin-plate (592). At one end a thin sharp piece of iron or slip of tin is to be let in, and fastened down, but must extend or project about half an inch beyond the board. To this must be added a piece of coarse linen, eight inches wide, and sufficiently long to go round any hive or box you use, and leave about six inches over: At one end of this cloth, and near the edge, a wire hook is to be fixed, in order to fasten it and keep it tight when extended round the hive. This is the whole of the apparatus.

601. When about to use it in taking off or separating a hive or box, let the cloth be previously

previously made pretty damp; then stopping up the door-ways of the Stock you would separate, draw the *edge* of the cloth round the skirt of the hive, within one or two rounds of its bottom, and fasten it tight with the hook. The intention of wetting the cloth is, that whenever the hive be lifted up it may drop evenly down. An assistant is then to lift the hive up, (first giving it a little twist, to loosen the combs from the under hive) just high enough to admit the boards being slipped under it. In doing which great care must be taken, not to slide it against or to intangle the cloth, but to pass freely under it, the bottom edge of the cloth, hanging upon the board as it passes. By this means, though the hive be lifted so high that the Bees might easily escape, yet the cloth, like a hanging curtain, falls upon the board so close all round, as to prevent their passing. The chief nicety of the operation is in the first introduction of the board: Be careful therefore to lift up the cloth a little and clap the end of the board to the joining, where it is to be introduced; set down the cloth upon it; the assistant is then to proceed as above directed. As soon as taken off it is to be treated in the same manner (594).

602. But it would be better if this board be made so as to receive a brass-wire net-work about ten inches square, with the mesh not wide enough for a Bee to pass through it, and let into a rabbett, and tacked thereto

thereto with slips of tin to keep it fast and so as not to rise above the level; it will then be very convenient for the inspection of such hives as have no windows; for by setting the board upon the frame of a chair, or stool, by the side of the stock, then stopping up the door-way of the hive, and lifting it off upon the board, you may easily peep underneath and inspect it as long as you please with the greatest safety. Or you may turn it upside down, to inspect it. After you have satisfied your curiosity, the door-way is to be unstopped, and at night the Stock placed on the stand again. Or, it may be lifted thereon as soon as you have done.

603. It may likewise serve for the same purpose in ascertaining the strength of Swarms, and in purchasing Stocks or Swarms. So that considering the very trifling expence of this whole apparatus, its simplicity and extensive usefulness, together with its great durability, when taken proper care of, it may perhaps with justice be esteemed the best adapted for performing the separation by day-light, and as perfect as the design will possibly admit of.

604. But those who do not choose to be at this expence, may have cloth of sufficient dimensions to draw over a hive, with a circle of about ten inches cut out of the middle; and any kind of net or open work, that will not permit the Bees to pass through, sewed therein; this will answer every purpose, except *separation*.

605. The last process we shall particularize surpasses even the foregoing, both in the facility of the execution, and as requiring no expence for instruments.

In order to separate an upper hive, on the preceding night close up the door-way with a rag; and then run a thin long knife between the hives, as far as you can, so as to loosen the combs from the under hive. This indeed will somewhat irritate the Bees; but their anger will subside before the next night; and the operation will be greatly facilitated by it. The next night lay a cloth upon the ground before the Stock you want to separate, and stop up the door-way with a rag; then have a board or loose floor ready placed by the side of the Stock; and, after thrusting in the sliders, give the hive a little twist, lift it up, and set it upon the board or floor. Immediately with a knife or piece of tin, scrape from off the bars such Bees and pieces of comb, as may be thereon, towards the front of the hive; so that they may fall on the cloth. By this management the loose Bees will be preserved. The cover is then to be put on as quick as possible, and the sliders taken out; and the hive that is taken off, to be removed to an out-house. In the same manner treat as many more as you want to separate; setting them in rows, or marking them first, that you may readily know to which Stocks they respectively belong.

606. In

606. In the morning, take the first and drive them into an empty hive; and as soon as this is done, strike them out again upon a cloth placed before the hive they belong to; one end of the cloth being also tacked up to the resting-board, by which they will crawl up, and re-join their companions. Then proceed to the second in the same manner, and so of the residue.

607. But if the operation be performed in fine settled weather, instead of removing them into an out-house, turn them upon their sides, (upon chairs or the like) with their bottoms or open ends to touch the resting-boards of the Stocks; and before morning most of the Bees will have deserted their own hive and got to the main Stock, without driving. Those that have not, must have a cloth thrown over them, and be taken to a considerable distance, or to an out-house and drove (372). It will be necessary to observe the rules relating to the probability of there being separate Swarms among them (401.)

608. Here I would remark that after separation, the Bees are so terrified, that when turned out, they will readily pass into another empty hive and there remain several days, until their terror is abated, though no Queen be with them. Nor will Bees quit a hive stored with honey or brood when separated, unless by force; or by being left several days, in which time much of their honey will be consumed by them; or by
neigh-

neighbouring Bees, Wasps, &c. so that force or stupefaction is the only eligible method.

As those Bees which escape during the operation, will cluster together about the place where it is performed, they should be gently brushed off as often as they settle: but if this be not done, they will return home either the same or the next night.

609. If *under* hives are to be taken, lift off the whole together, and set them on a proper support close by. Then placing a fresh floor on the stand, lift up the upper hive, and set it thereon. The hive left, must be managed as those before-mentioned (607).

610. Should a Stock be so full of Bees, after having been separated, as to lie out, set an empty hive over them until the latter end of September; at which time great part of the brood having quitted their cells, and the nights being also cool, they will all readily go into the under hive; the empty one should then be taken off.

611. It must be very obvious to persons conversant with Bees, that nothing so much enrages them, as being robbed of their well-earned treasure; consequently to attempt it at a time when they are most vigorous and irritable, even in the face of the sun; must be attended with much more difficulty and danger than when they are surpris'd in the chill of the night, and under the mask of darkness, and when they

are incapable of seeing the invader. The business also is generally over in this case before they are recovered from their consternation.

612. Collateral boxes are separated with more ease than story boxes, as having bars and sliders to each; whereby the Bees are so confined that not one can come out. But if a loose bottom frame be made to the story boxes with bars similar to those of the top (124), there will be no pre-eminency in this point, on either side; for in both ways, unless very great care be taken to cement the joinings, the moth will certainly breed between, and endanger the Stock.

613. It is possible that by some mismanagement, or accident in separating, the Queen may be killed; (though I have seldom met with such a mischance). This may be discovered by the tumult of the Stock Bees. In such a case it will be best to *unite* them to some weak Stock, if it happens not to be later than the middle of July, that they may have time to replenish the hive. But otherwise, unite them to a well furnished Stock for the winter.

614. I have tried to take honey in a similar method to that of the Greeks, as related by Sir George Wheeler. This on reading seems indeed very simple and easy; but whoever shall make the attempt will certainly find it both extremely troublesome and dangerous; and indeed not to be done, unless com-

completely armed. But instead of any of these methods, that of stupefaction, before-mentioned (389) may be used; as the Apiator shall find most eligible and agreeable to his own ideas.

615. Whoever would wish to make the most of their Bees, should never let them be in want of room; for whenever additional hives seem full of honey and crouded with Bees, they must be taken off, and others, or glasses, set on, as long as there is plenty of honey pasture, that no part of the honey harvest may be lost. Whenever Bees croud about the door-way, and seem idle (after swarming-time is over), it is a sure sign they want enlargement.

616. In common hives this advantage is intirely lost, especially, where the situation is very good, and the season favourable; for when the hive is once filled, the Bees can do no more; and therefore, take their pleasure and are very joyous. Many country people, have not even the sagacity to raise them by an ekeing or lift, (499). Nor indeed can those cots that have shelves one above another, admit of it, if they had the inclination. So ill contrived are those receptacles for Bees.

617. It is of great consequence to know, or observe, when the Bees have done honey gathering; for that must be the general time of taking up hives in the common way, as also from all those that yet remain doubled,

on the improved plan. For as soon as the flowers decay, or cease to yield their luscious sweets, the Bees will begin to feed on their hive honey; and particularly those in the doubled ones on that hive which they do not intend to be their winter store. And should there be many Drones left at that time, a great deal of honey will be consumed in a very few days. No gormandizers at a turtle or venison feast, can be more voracious than the Drones are at this time.

618. About the beginning of August is the usual time of failure, especially if a good deal of rain happens to fall then. But as our seasons vary, so will the time for the ceasing of this business. The summer of the year 1779 being hot and dry, the flowers were exhausted long before the usual period; therefore Stocks should have been taken, near a month sooner than most of them were; (the heath countries excepted). This was the reason that many Apiators had not near the honey they expected; because they had let their Stocks stand until great part was eaten. For the Bees will consume more honey in the first five or six weeks after collecting is over, than during the whole winter; unless it prove very mild.

In some former years I have perceived the Bees begin to eat the honey out of the new combs in my boxes, and out of the glassess that were over them, as early as the 25th of July. The country people are greatly deceived in
this

this matter; for seeing the Bees continually carrying in a yellow substance upon their legs, they unjustly conclude their store is increasing, whereas it is quite the reverse; this substance being only to feed the young; and as these are continually increasing until October, so much the more honey will be consumed, without the least advantage to the owner. For these very young Bees, as well as the old, are all to be suffocated together; however late the time of taking may be. A practice as absurd as it is unprofitable!

619. Through the windows of box hives may be readily seen, when the Bees begin to empty the cells of their honey; which will be a profitable advice with regard to all the rest, if the Apiator be provident enough to attend to it. But it is more particularly important to those that destroy their Bees. For the longer the Stocks stand in these circumstances the greater will be the diminution of the honey; not only by the old Bees, but also by the continual hatching of the young; which continues even so late as October. But in the double mode, the detriment is perhaps not great; as all the young Bees are saved; whether taken up early or late (588).

620. The following rules and precautions should be observed in taking up the Stocks in autumn.

621. Take up all that are more than two years old, for the combs after that time will

become black and foul, by being the receptacle of several repeated broods. Great part of them are also crammed with stale and useless farina, which altogether causes a hive to feel heavy, which when taken yields but little honey, of a very bad quality; and so small a portion of wax as hardly to answer the extraction. Old hives are also very subject to the moths, which destroy many Stocks every year. The Bees of such Stocks may be drove and added to other Stocks; or drove into one of those hives you have taken of the present year, that is properly filled with honey.

622. In these particulars the double method has also a great superiority; for by so frequently shifting the hives, the combs are never old and black, nor stuffed with stale farina and other impurities; consequently yielding more wax and honey, and of a purer quality. For the impurities being interspersed among so great a number of cells, it is next to impossible to procure the honey without some mixture of such heterogeneous matter.

623. Take up all Stocks that are light, and that are neither full of Bees or honey.

624. The greater the number of Bees in a hive, the larger must be the quantity of honey to support them until next season; consequently a hive full of Bees, and but little honey, must be *taken*; or both Bees and honey will be lost.

625. Stocks in autumn that are full combed down to the floors, should be taken: one
such

such is worth three or four others. nor will they be so proper to stand; for, being quite full of honey, in the spring there will not be vacant cells enough to deposit the brood in; and therefore though the Stock in spring may be rich in sweets, yet it will be but poor in Bees, and consequently not likely to swarm that season; or if it should, the Swarm will be late and inconsiderable. In our double method no such inconvenience can arise; because another hive can be furnished them in the spring as soon as they seem to want it.

626. When a wet summer makes honey scarce, keep the best Stocks: but after a dry and plentiful one, a moderate Stock will prove best for store.

627. No Stocks should be left, unless three parts full of honey, as near as you can guess. The Bees of those Stocks, which have not quantity, should be incorporated with others that are well provided.

628. To judge of the weight and fullness of hives, observe the directions (586); this may also be sufficiently well judged of, by poising them in your hand; by which method, after a little experience, you will be enabled to make a proper estimate. A memorandum may likewise be made of the weight of an empty hive or box, floors and all; by which means the weight of a Swarm or Stock may at any time be known to a great nicety; first stopping up the door-way to keep the Bees in, and then weighing the hive.

629. Several weak Stocks should be united into one, and placed in a good hive of honey, which will both save the Bees, and form an excellent Stock for the next year; for weak Stocks generally perish in the spring. Though I have known instances of weak Stocks situated near a large common, skirted by woods, and with few others Bees in the neighbourhood, that have prospered; and the ensuing spring proving early and favourable, have sent out large Swarms; however, it is by no means prudent to trust to such contingencies.

630. It may be taken for a general rule, that the more scanty your pasturage, or the poorer your situation, so much the more populous and richer, should the Stocks be that are left for the next year. Casts in general are never worth keeping; but should be united at first (366): however, if inadvertently any are standing in autumn; they are to be drove out, and incorporated with other Stocks; but as their combs are virgin, and great part empty, they should be carefully preserved as decoy combs for your glasses next year. These should be wrapped up in paper, and deposited in some dark but dry place; otherwise the moth will get to them, and eat up the wax. Or some of the hives may be preserved, being closely stopped up, and taken care of as above-mentioned. These will excellently serve for additions to your old Stocks the next year; for the Bees finding so much ready-made furniture, will more certainly quit their old habitations.

631. If

631. If a bee-keeper resides in such a situation for pasturage, as to admit of keeping a large number of Stocks, and is desirous of so doing, he must observe to leave standing all those each year, that are *proper* for it, until there be the number wanted.

632. In the double method not only *this* should be attended to, but *also*, not to raise or double your hives until they swarm, or at least not before it be too late for them to swarm with success; or in case of much lying-out. From hence it naturally follows that the profits must be very limited, until the desired increase be made; but when that point is once obtained, there will soon be ample interest for all the trouble and forbearance.

633. If Stocks are left double until autumn, the Bees will gradually ascend into the upper box or hive, as fast as they consume the honey of the lower one, and in proportion as the weather grows cooler. At this time no Bees will guard the door-way, and therefore either the box must be taken, or the lower entrance stopped up, and the upper one opened; otherwise wasps or robbing Bees will invade and ruin the Stock. From the same principles the Bees of a common straw hive, that have been set over a Stock inverted or turned upside down, will *descend* therein at the approach of cold, provided there be but one Queen in both.

634. Bees greatly decrease in autumn and winter. A great many that were bred in the spring or in the preceeding autumn, die of age; others

others of hard labour, cold, and a variety of accidents ; so that hives which were very full of Bees in the latter end of summer, by November appear very vacant ; nor will they cease diminishing, till a fresh brood begins to replenish the deserted cells. This should seem a convincing demonstration of the *necessity* of saving the Stock Bees, when the honey is taken, instead of suffocating them. For these hives contain as many young Bees as those you preserve ; and when both united together, form a very populous Stock for the spring ; even after the inevitable decrease, by a natural old age. Some prejudiced people, however, will always shut their eyes against the clearest light !

635. Weak Stocks may at any time be strengthened by Casts, or by holding a large mouth'd bottle to the entrance of a very populous Stock, when gently striking the hive numbers will be in a hurry to come out, and so be caught therein. As soon as you have got a sufficiency, cover the mouth of the bottle with a paper, having air-holes in it ; at night fix the mouth of the bottle to the mouth of the hive you would replenish, closing up all other openings ; the Bees will soon quit the bottle to enjoy more comfortable accommodations ; or by setting some honeyed combs upon a hive floor, and an empty hive over them, great multitudes will be attracted to feed : when there is a company adequate to your intention, stop the door-way, and thus confine them until night. Take the hive gently
up

up, for the Bees will be collected at the top, set them over or under the Stock you wish to strengthen, and the next morning or evening take away the empty hive.

636. It is worthy of remark, that when by age or any accident a Queen dies, the Bees of that hive commonly quit it, and join themselves to some other Stock: but to make themselves the more acceptable they gradually take the honey from their own hive, and carry it as a present to their new associates. That such an accident has happened to a Stock may be known by a clear and uninterrupted humming of the Bees in the hive; by there being a great croud at the entrance (provided it is not swarming-time); by their seeming melancholy and indolent; by their not carrying any farina; and appearing not to fight or quarrel.

637. Upon any suspicions of this kind you may by attentively observing, readily discover to which of your Stocks they are carrying the treasure; for in this case the Bees of this Stock will be seen in an unusual hurry, and precipitately going in and out in great crouds. You may either permit them to continue carrying off the honey; or if the queenless Stock be your own, poise it in your hands, and if you judge there be honey enough left worth taking, at night remove it to an out-house, and if there be any Bees in it, drive them out into an empty hive, and set it close to the Stock, mouth to mouth, and they will unite with the Stock before morning, otherwise you would lose all the honey.

638. But

638. But if the hive be heavy, full of Bees, and perhaps a large brood, and if the Queen has not been long dead, it will be prudent to preserve it. This may be done if it be at a time, that some of your Stocks can spare a young Queen, or even a royal cell sealed up, which being put just within the door-way will be received with the greatest pleasure, and will immediately encourage them to proceed to their work again. But otherwise, set the hive over a weak Stock to incorporate with it.

639. All Stocks however do not desert their hives on this melancholy occasion; but will continue to work, though very little, and with no spirit; and will gradually decrease, until at last none are left; or perhaps before that period, will become a prey to robbers.

640. If a Queen dies, though several weeks after a swarm is hived, they usually desert their hive, and return to the mother Stock, transporting their honey with them.

641. As many country people, notwithstanding all that has been said, or all the arguments that can be used, will yet remain obstinately blind to their own interest, and annually destroy their Bees; therefore, that we may not be accused of a fond partiality, we subjoin the pernicious method.

642. Prepare a few rags dipped in melted brimstone; these, at night, are to be set on fire, and laid in a hole made in the ground near the bee-stand. The Stock is then nimbly to be taken

taken off and set over the suffocating fume, which in a very few minutes destroys the lives and happiness of thousands. A few strokes of the hand, will cause those that still hang among the combs to fall; which concludes the dreadful catastrophe!

Alas! ill-fated Bees! doomed to be victims of your own industry!

643. The cruelty of this practice, the poet has adverted to, with such pathetic energy, that I feel myself constrained to transcribe it.

644. "Ah see where robb'd and murder'd, in that pit,
Lies the still heaving hive! at evening snatched,
Beneath the cloud of guilt-concealing night,
And fix'd o'er sulphur: while not dreaming ill,
The happy people, in their waxen cells,
Sat tending public cares, and planning schemes
Of temperance, for winter poor; rejoiced
To mark, full flowing round, their copious stores:
Sudden the dark oppressive steam ascends:
And us'd to milder scents, the tender race,
By thousands, tumble from their honey'd domes,
Convolv'd and agonizing in the dust.
And was it for this you roam'd the spring,
Intent from flower to flower? for this you toil'd
Ceaseless the burning summer heat's away?
For this in autumn search'd the blooming waste,
Nor lost one sunny gleam? for this sad fate?
O man! tyrannic lord! how long, how long,
Shall prostrate nature groan beneath your rage,
Awaiting

Awaiting renovation? *When oblig'd,*
Must you destroy? of their ambrosial food
Can you not borrow; and in just return,
 Afford them shelter from the wintry winds;
 Or, as the sharp year pinches, with their own
 Again regale them on some smiling day?
 See where the stony bottom of their town
 Looks desolate, and wild; with here and there
 A helpless number, who the ruin'd state
 Survive, lamenting weak, cast out to death.
 Thus a proud city, populous and rich,
 Full of the works of peace, and high in joy,
 At theatre or feast, or sunk in sleep,
 (As late, PALERMO, was thy fate) is seiz'd
 By some dread earthquake, and convulsive hurl'd
 Sheer from the black foundation, stench involv'd,
 Into a gulph of blue sulphureous flame."

THOMSON'S SEASONS.

645. But to countenance this yearly massacre, a very plausible reason will be retorted upon me. That as Bees live but a *year*, to what purpose keep an old or last year's Stock which will die of themselves, tho' we do not destroy them? A hive of Bees may be compared to a city, whose inhabitants considered *singly* have a limited and short duration, but the City may continue populous, for a thousand generations. There is a continual succession of births, as well as of deaths. So is it with the city of Bees, in which, at the usual taking-up-time, there are Bees in every stage of life; from infancy to mature old

old age. And are in this respect, upon a par with any Swarm you have. The walls of their city indeed, being made of straw, soon decay, and their combs, after two years become black and foul, and detrimental to their future prosperity. But the Bees as a collective body, will perpetuate their societies, like every other class of creatures, as long as the world endures.

646. But here it may be asked, if we are never to destroy the Bees, what is to be done with them, when we have as many as our situation and pasturage will support? Whenever you become so fortunate, augment each Stock, by re-uniting the Swarms again to them (379). By which means your Stocks will afford you a very great increase of virgin honey, or of glasses of honey of high value.

647. When Stocks are so populous as to contain in each of them, as many as three good Swarms, it is as many as will thrive together in one hive; therefore if you have still more Swarms, unite two or three of these to form one Stock; and should you have too many Swarms; either sell *them*, or some of your Stocks, or, obtain permission to set them in distant gardens. For unfavourable seasons will come, accidents may happen, and your home Stocks be diminished and want a reinforcement.

648. Lastly, there is one way, super-eminent in wisdom and beneficence; rather than expose your superfluous Stocks to a needless and barbarous burning, give them to
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some of your poor, but deserving neighbours, who live at such a distance as not to interfere with the pasturage of your own Stocks. So will the hungry be fed, and your own hearts exult in the pleasing joy of conferring a benefit on a deserving family, and saving the lives of thousands of such industrious insects.

CHAPTER XVIII.

*Of Wasps, Mice, and other Destroyers of BEES,
with the Means of Prevention.*

649. **T**HE Bees, like many other worthy and industrious people, are often plundered of their well earned wealth, circumvented in their honest labours, and robbed of their peace by the idle, the vicious, and the envious.

Of this wicked fraternity, the Woodpecker or (as some call it) the Tree-creeper stands foremost, seizing them without mercy, as they are gathering farina from off the fallows, in early spring.

650. The Sparrow and that voracious and daring bird of superstition, the Robin Redbreast, will peck them off the flowers, or even (as I have often seen) stand upon their
resting

resting boards and seize them as they issue from their hives. Swallows catch the Bees as they fly and carry them to their nests. These birds should be destroyed by the gun, by limed twigs, or by giving a few pence to children to take their nests.

651. The mouse is a very formidable enemy in the winter, destroying a Stock presently; to which he is often tempted, by the large and deep gashes injudiciously made by country people in the edges of their hives, by which he is admitted without obstruction or difficulty. But where this is not the case, he will endeavour either to enlarge the entrance, to make a fresh opening in the skirts, or some other part, or make a lodgement over the top, under the hackel, and there form his nest; and by degrees gnaw a way through into the center of the hive, for the more ready support of himself and young. Therefore where hackels are used (pans are not so liable to this inconvenience) the tops and skirts should be often examined. The door-ways should also be lessened, by pieces of wood, cut to proper dimensions, or by plaister or clay, thereby rendering the entrance too low for them, as well as slugs or snails to enter.

652. But if your Apiary be much infested by mice, traps should be set; or a kitten, reared and fed therein without being suffered to come into the house, will at the same time keep the mice from your Stocks, and the birds from your grounds, and there-

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by

by not only preserve your Bees but also your garden seeds. The kitten, however, of any cat indiscriminately will not do. Cats, as well as men and monkeys, have a diversity of talents, adapted to different purposes: therefore choose one from a dam famous for birds and field mice, and let the kitten remain with her mother long enough to receive her instructions, and to profit from her example. There are few quadrupeds but what give their offspring an education, suitable to their situation in life: whether all bipeds do so too, I pretend not to determine. Besides, the amorous parley of a congress of cats on a starry night will prove highly terrific to this whole species of vermin.

653. When those slow movers, the slugs, blunder their way into a hive, it is by mistake and not by intention; (for their taste is not suited to relish such sweets) and their company is as disagreeable to the Bees, as that of drunkards, or a debauchee, would be to a society of angels; however as these simple insects do no harm, they will in time find their way out again. I have often seen them against the windows of my boxes, but never found any, either dead or alive, when the boxes have been taken up.

654. Hornets in spring, will watch the coming out of the Bees, and destroy them. But as these fierce insects are few in number, and scarce, unless they be nested near the Apiary, they seldom do any great damage.

655. Wasps are extremely dangerous at the

the latter end of summer, and in autumn. A Wasp is much stronger than a Bee; so much so that one will disengage himself from two or three Bees, and probably with the death of one or two of them. They are very bold, and will frequently get into a hive in spite of all obstacles, and at the greatest hazard, but are generally either killed or escape loaded with the choicest honey. But when the weather grows so cold that the Bees cannot keep guard, numbers will then get in and devour a great deal of honey, as well as many of the Bees; and should the Stock be weak, will totally destroy it.

656. The winter's wet and cold generally kill many of the Mother-Wasps, while in their torpid state. If the spring also be wet and cold, it hinders their breeding, and causes the brood to be few and late. Should the beginning of April be warm, and afterwards cold and stormy, it will prevent their coming out for food, and most part of them will be starved to death; freeing the Bees from the danger of them that year. Nay, a continuance of wet, though without cold, so spoils their nests, that few Wasps will be seen 'till the middle of September. But a mild winter, when succeeded by a hot and dry spring and summer, will so favour their increase, almost in every place, that, without diligent attention, many Stocks will be ruined by their depredations.

657. The best time to prevent a great increase of these mischievous insects is in the

spring ; by killing the Mother-Wasps, in March or April, when they first make their appearance, among old timber and buildings, to collect small shivers of the wood to form their nests with. They also visit the gooseberry and currant bushes about that time. By destroying *One* then, you in fact cut off a whole brood. For all the common Wasps, or Workers, die in the autumn, leaving only the females, to renew the species the next year.

658. Phials of sugar and ale hung about the places of their haunts, will attract their notice, and allure them to their destruction. But these must not be placed among your Bees, for they also will then sip and die; therefore, wherever you set the phials, they must be well looked after, and if the Bees are observed to visit them, they must be removed further off, or stopt up, until honey gathering commences : at which time the Bees will be in no danger ; at least not till the latter end of the summer when as young Wasps beginning then to be very numerous, many persons very imprudently place phials of sugar and ale among their bee-stands, thereby enticing all the Wasps of the neighbourhood into their Apiaries. This however should be cautiously avoided as above directed.

659. Perhaps a piece of liver, or sweet fruit put into the bottom of a long necked bottle, would be most eligible ; the Bees, not liking such entertainment, will then be in no danger.

670. It

670. If Wasps are seen to attempt any Stock, especially in autumn, contract the door-way by a piece of tea-lead or tin, pierced with holes, and fastened thereto, leaving only about half an inch for the passage of the Bees. For a few in number can defend a small pass against a mighty host. But should the Bees seem remiss and not sufficiently courageous to do their duty, thrust a small twig several times into their hive; this will rouse and irritate them, so as to make them vent their fury upon the Wasps; and the Apiator too if he does not make a nimble retreat.

671. Wasps nests should be sought out, and as many destroyed as possible. For a trifle boys will do it by way of diversion. The best method of doing it, is to take half an ounce of gunpowder, wet it just sufficiently to make it stick together to burn without explosion, similar to what the boys call a wild-fire. Put it into a paper, rolled up like a quill, of about a finger's length: leaving one end open. It must be made up but a little while before it be used, or it will grow too dry. A little before night, or very early in the morning, when the Wasps are all at home, examine if there be any more passages to their nests than one, and with a clump of earth or sod, stop them all up but one, and have another sod in readiness to stop up that also. Then with a match set fire to the end of the squib, thrust it directly into the hole or mouth of the nest, and immediately stop it up with the sod as close as possible,

that none of the fume may escape. In a few minutes the Wasps will be all suffocated, but will recover again in a short time if exposed to the air; therefore for the greater certainty, the nest should be dug up with all expedition, and either burnt or buried. The nest may be dug up whole, as a natural curiosity worthy of notice. Some nests may be very extensive, and will therefore require double the quantity of gunpowder. If two ounces be used, and all the passages well closed up, they will be so effectually suffocated as to rise no more. The young brood of the nests, will furnish an excellent entertainment for poultry, or for fish, if thrown into the ponds. The tops of their nests are often within half a foot of the surface, but sometimes not within a foot or foot and a half.

672. Or a hole may be made just over the top of their nests, and a large quantity of water poured therein sufficient to drown them: Boiling water will quickly and effectually destroy them, either in the ground, or among thatch, or in hollow trees. In situations where the other methods cannot so conveniently be pursued, smoke and the fumes of brimstone may be introduced, in order to dislodge or smother them.

673. Hornets hang their nests to the eaves, rafters, beams of barns, out-houses, or in hollow trees. They are of a globular form, the external part of which, like that of the wasp's nests, is composed of the fibres of wood, and much resembles coarse greyish paper. As they are
more

more formidable and dangerous than Wasps, so their numbers are proportionably smaller. The best way to effect their destruction is to take a bag large enough to slip over their nest, the mouth of which should have a running string, whereby it may easily be drawn close together.

674. On a rainy day or night, gently draw the bag over the nest so as to take the whole in, and immediately draw the strings tight, so that the nest and hornets altogether be fast included in the bag, which should be directly immersed in water, and remain an hour or more; after which it may safely be taken out, the nest pulled to pieces, and the hornets brushed off and buried; but the cakes that have brood in them, as well as those of Wasps, if given to your poultry, will prove a delicious feast.

675. The next enemy to our industrious Bees, is a large moth called the Wax-Moth, as the maggots proceeding from it devour the wax for their sustenance. The mother of these insects, is extremely attentive to discover every crevice, chasm, or hole about a hive, especially about the skirts, as a proper nests for her eggs. Should she not prove successful about the externals of the hive, she will watch an opportunity of slipping within, and of doing it there. The eggs soon become a large, white, and voracious maggot, which spins over itself a defence, and annoys the Bees. The maggots continually increase and consume the combs, until at length they pos-

less the principal part of the hive, and the poor Bees perish with famine, or are obliged to separate and seek new habitations. Old straw hives are very subject to the depredations of these insects, having such inviting harbour for them. Boxes are not so subject to be infested with them as hives, especially if the crevices and joinings be carefully stopped up with any kind of cement: but neither boxes nor hives in the double method are liable to suffer much from these destroyers; for being so often shifted, they have not length of time, even if they get in, to prove very formidable. Which is another proof of the advantages of our changing open method.

676. However it is very proper, as a great preservative from vermin, that all hives and boxes in the spring and autumn be now and then lifted up, the edges rubbed and the floors cleansed; or, if the floors be moveable, exchanged for fresh dry ones. The best time to do it is early in the morning; when the Bees are chilled and drowsy, it may be done so nimbly as to be finished before they have recovered themselves enough to molest you. This is particularly needful in the spring, as soon as the Bees seem brisk: as during the winter there will be a collection of crumbs of wax, dead Bees, that perhaps have died of age, and other filth; which, if not removed, will annoy the Bees and hinder their work.

677. Wood-lice are also great destroyers of Bees. Bee-stands, cots or houses, that are made

made of old decayed wood, harbour and encourage their breed. Old timber or old hedges, near the hives have the same bad tendency. During the cold of the winter and spring they will breed in the combs and consume the honey. They should be often sought for and killed.

678. Earwigs are nightly plunderers; they can enter by a very narrow chasm; and conceal themselves in a very small space. They steal in at night, drag out Bee after Bee, sucking out their vitals, and leave nothing but their skins, as so many scalps, emblems of their butchery; thus gradually diminishing the Stock, while the Apiator is oftentimes ignorantly wondering at the cause. When the shells of Bees are perceived about a Stock, it shews the pernicious business is begun. Search for the nests of the ear-wigs, and kill them. Close every crevice that may have given them admittance: the edges of the hives and floors, and every part of the stands or house must be brushed and made very clean. Let no straw, rags, or cloth remain about the hives, for these insects presently conceal themselves and settle therein: and continue to search for them every day, so long as any mangled Bees are found about the hive.

679. The hives and houses should likewise be often brushed, and kept particularly free from spiders webs. This requires to be done almost every day during the summer; or many of the Bees will be intangled in these fatal nets, and become victims to these solitary devourers.

680. Snails

680. Snails and Slugs should often be searched for, and taken away; and nothing left about the hives to conceal them.

681. Cleanliness is an article of consequence in the preservation of Bees, as may be seen by the many enemies with which they are encompassed. Their increase and prosperity therefore, may rationally be expected to be in proportion to the care taken of them.

Riches seldom flow into the lap of indolence; but the hand of industry shall be rewarded with plenty.

CHAPTER XIX.

Of their WARS and ROBBERIES, and Directions how to terminate or prevent them.

682. **A**MAZING! can such epithets be applicable to the industrious Bees? Yes, it cannot be concealed, that in some particulars, they but too much resemble the *rational species*. But which are most to blame? Let the philosopher and the divine determine. I am only a champion for the Bees, and hope to exculpate them.

In

In their own habitations, and among their own communities, as well as when at their labours, Bees are as pacific as a monk in his cell : but if pinched with hunger, at a time when no provision is to be got by *honest industry*, they become desperate and furious : " Hunger, (according to the old proverb) " will break through stone walls : " The Bees, thus situated, will turn robbers rather than die. But among the rulers of mankind can this necessity be pleaded for the deluge of blood so frequently spilt ? Alas ! no !

683. Bees are never poor through want of provident care, or through indolence, on their own part ; but frequently from a long continuance of inclement weather, or from swarming too *late*, or through an insufficiency of numbers. When by some or all of these causes, they have been prevented from replenishing their hives in time, they consult upon furnishing themselves in an expeditious manner, by besieging and plundering the castles of some of the neighbourhood.

684. Being determined upon the point, scouts are sent out to obtain intelligence, and others as spies, who if possible are to get in undiscovered, and to make the proper observations of the force, strength, and treasure of the Stock to be attacked. At first the spies are very timorous, trying to pitch here and there, and sometimes settling at the doorway to make observations, and then are upon the wing again. The invaded Bees at the same instant, if they are strong in force, will endeavour

endeavour to seize and dispatch them for their insolence; from which time a strong guard will always be kept at the entrance.

685. But if a few have been so successful as to get admittance, and taste the sweets with impunity, the next day they will form a regular attack in full force. In consequence of which, a most fatal scene of war and slaughter will ensue. All is fury and tumult: kill or be killed is the dreadful alternative. Thousands on both sides presently lie dead or dying; nor does night put an end to the conflict. Day after day, the bloody contest is renewed, both within the hive and without. For the invaders will never give out if they have once penetrated so far as to open the sealed combs. In this case nothing but fury, desolation and death is to be seen throughout the whole domain. One only circumstance excepted; which is, the death of the Queen of the invaded Stock. This the enemy knows, and therefore to make short work, the boldest of them endeavour to rush upon her as soon as possible; in this attempt great numbers fall victims to their rashness; but whenever any of them reach her, she is instantly slain. A truce is now immediately sounded by both armies, and hostilities suddenly cease, an alliance is made, and the vanquished Bees assist in transporting their own treasure to the castle of their invaders.

686. Sometimes however, the Queen, and a few of her subjects, escape; leaving her city and treasure in the possession of the conquerors.

querors. Sad reverse of fortune! bereaved of every thing! what expedient can save them? famine or fighting is the deplored alternative. The last, as the lesser evil, is preferred. They become in their turn, a set of lawless rovers. Seeking therefore another Bee-garden, they endeavour to retaliate their cruel treatment on some of these: and in the attempt will surely die or conquer.

687. Will the senate decree a civic crown, to him who shall point out the method of terminating these ruinous wars and saving a Queen.

688. Crown or no crown, we will try our skill. Whenever strange Bees are seen, trying to slide into a hive, the door-way must be contracted to half an inch, as a narrow passage can be easily defended by a few against a great number. This is best done by slips of tin or tea-lead perforated with holes; and having a passage cut out at the bottom of half an inch in length, and fastened to the hive by a nail at each end: or, by a piece of elder slit and the pith taken out; two of these are to be placed in the door-way, the rest plaistered up with clay or cow dung. Then thrust a twig into the hive, to rouse the anger of the Bees, to make them keep guard. But if notwithstanding this, the next day more strangers appear, stop the hive quite up, leaving only some air-holes.

689. By these means, both the true and false Bees will be kept out 'till evening, when
those

those of all the other Stocks are gone to rest: at which times the false Bees that are without will return home; then unstopping the hive, if any false be within, they will also issue out and depart, and your own Bees that were kept waiting without will enter.

690. Feel the weight of your hive, and if in good condition and sufficiently stocked with Bees, you may venture to let it stand a siege the next day, provided the door-way of it be stopped very early the next morning, some time before any Bees are yet abroad. In consequence of this, the enemy Bees, as fast as they come and are attempting to enter, may be knocked down with a piece of thin board, or the like, and killed, by a person appointed on purpose: this is to be continued without intermission, so long as any of them appear. In about four, five, or six hours, according to the number, the whole will be destroyed. After waiting an hour longer, and no more are perceived to come, your own Bees may be let out. This confinement will make your own Bees furious against any future assault.

691. But should a Stock be assaulted, and the fight begun before you are apprized of it, immediately stop the door-way up; and at night, if you find it poor and weak, unite it to some other Stock (380), taking care to preserve the brood (588); for being so much weakened, it will hardly turn to any account in standing, or will most likely fall a prey to some other invaders.

When

When a Stock is beset day after day, it is a sign that the robbers have tasted deep of the nectar; in this case it will be best to take it, if light, and to drive the Bees and unite them to another hive. But if weighty, let it stand, and kill the robbers. If they are not killed all in one day, two or three days may be taken, keeping the Bees stopped up all the while. But it will be best to finish them if possible in one day, lest in revenge for their disappointment they should fall upon some of your other Stocks. A good method to prevent it, is to irritate all your other Stocks by thrusting a twig into each of their hives.

692. When a Stock has been assaulted, but presently becomes quiet, and great crouds are observed going in and out, it denotes the death of the Queen. If this Stock be not immediately stopped up, all the honey will be carried away. In the evening unstop it, and about an hour afterwards, the Bees will have all quitted it, and what honey they have left will be at your service.

693. An attack by robbers may be easily known by the number of dead Bees on the ground before the hive, as also by the crumbs of wax about the entrance of the hive, and by the Bees therein being in an uproar and confusion. These battles of the Bees are more or less violent in proportion to the number of Bees invading or invaded, if the Stock be weak, and the robbers numerous, victory soon follows the first assault.

694, If

694. If a Stock happen to be without a Queen, it makes but a feeble resistance, or oftener none at all, which is also the case when late in the season, and the weather cold: For this occasions the bottom of the hive to be left vacant and without a guard at such times an half inch door-way will be fully sufficient.

695. As soon as robbers begin to shew their evil designs in a Bee-garden, the Bees of all your good Stocks will constantly keep guard at the door-ways. These are known to be *such*, by the unusual number of Bees *there*, at that season of the year; and by their being withdrawn as the intruders disappear. One year my Bees were obliged thus to defend their ports for near three weeks; now and then having slight skirmishes with the enemy; sometimes one Stock and sometimes another: but the robbers finding them all too well provided, and their reception rather too warm, retreated to a neighbour's Apiary, where they succeeded to the ruin of two weak Stocks.

696. These invaders, I afterwards understood, were a large Swarm of another neighbour's that did not rise until the latter end of July; and the remainder of the season proving very unfavourable, stern famine drove them to these daring extremities.

697. It is singular that Bees seldom or ever rob any Stocks of their own Apiary; unless there happen to be no weaker Stocks in the neighbourhood. Strong Stocks are very seldom

dom attacked; which is one reason, among many others, for keeping none but what are so.

698. The robbing-time is sooner or later, according as the spring or summer is more or less favourable; but it is generally twice a year, spring and fall. In the spring it is not much, compared to that in the fall of the leaf. If in the spring the weather prove warm, the Bees are thereby invited out; but, unable to procure honey from the flowers, and their own stock being exhausted, they are induced to become invaders of others property. The spring robbing is over the beginning of April, sometimes early in March, according as the flowers are more or less fit for furnishing subsistence.

699. But the most dangerous time is the latter end of July, and most part of August; nay, I have known some so late as the 3d of September. The Bees are most desperate in autumn, knowing they can then have no other resource. As soon as ever honey-gathering fails, robbing begins. Every day great attention must be paid to your Stocks, that the invasion may be seen before much damage is done.

700. When Swarms have been plentiful, but late, and the weather indifferent, it will be a dangerous autumn; and will require a very watchful eye to be kept over the Apiary. Whenever one Stock is beset, put your others in a proper posture of defence, by contracting the entrances: this may prevent their being

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put to the trial. A small force will defend a narrow pass against the power of a great army. However, discretion must be used in narrowing the door-ways, which must be done only in proportion to the number of Bees at work, that they may not be too much crowded in their passing in and out.

701. When a hive of any force begins to be assaulted, the Bees become very irritable and quarrelsome; they will then sting the Apiator, though familiar with, and fond of him at other times.

702. A weak Stock that is in danger, had better be united to another weak Stock (if you have such a one) that has honey enough for both: by this means they will form a competent Stock to withstand the enemy, to resist the severity of the winter's cold, and the scantiness of an austere spring.

CHAPTER XX.

On the great Mortality of BEES in Winter and Spring; the cause investigated, and how to prevent it: also the manner of feeding them to the best advantage.

703. **T**HE articles of this chapter are of great importance, as some hundred Stocks are lost every year, through ignorance or inattention to these points. Nor as yet, hath the practice been reduced to any degree of certainty, or well adapted to public use; writers having differed greatly upon a subject which, in appearance, seems of no difficulty. However it is hoped, the experiments I have tried will enable me to remove all the difficulties.

704. It must be considered, that Bees are capable of resisting cold only to a certain degree. That which reduces them to a lethargic, or torpid state, is salutary; for thereby becoming motionless, perspiration, and circulation of the fluids, are stopped, and the consequent dissipation prevented; in this state any fresh supply of sustenance is unnecessary. But the warm air of the spring, dissolving their coagulated fluids, restores them again to activity and to the impulse of hunger.

705. But should they be exposed to such a degree of cold, as to coagulate their fluids

beyond the influence of heat to restore, they are in a hopeless state, and cannot be revived.

706. But here occurs the grand difficulty; viz. that of knowing what degree of cold will keep Bees in the beneficial torpid state, without injuring them. It must be allowed that this is far from being a fixed point, and not easily to be ascertained. But though it is not prudent to walk too near a precipice, especially with a giddy head, yet we may safely approach it at some yards distance. We hope, therefore, to shew in the sequel, that any common capacity, may readily avoid each dangerous extreme, without being either a philosopher or a conjurer. Nor is there any necessity for a thermometer* to regulate to a nicety this part of rustic economy.

707. Though a Bee, single and at rest, be not able to resist a degree of cold much milder than that which congeals water, and will die in a temperament mild enough for most other insects of our climate; yet by motion it can acquire such a heat as will enable it to resist an air that has made me quake on going into it from a warm room.

708. It is well known that exercise will preserve the human body in a genial comfortable glow of warmth, though in an air so cold as otherwise would prove nearly fatal. The Bees experience a similar influence from motion.

709. When

* *Natural History of Bees*, p. 408.

709. When they are collected into a compact body, as is their usual manner in their hives, though then motionless, they retain, by their numbers, a very considerable heat, and which increases many degrees soon after, and in proportion to any motion commenced. To elucidate my meaning, let me compare a hive to a barn, on entering which singly, in a cold winter's day, our bodies will be chilled, and we shall feel ourselves very uncomfortable; but should it be soon filled with people we should presently become not only warm but even hot.

710. Though from the difference of situations, dispositions of places, and qualities of hives, we cannot form one certain rule, yet this we may safely infer, that the greater quantity of Bees there is in a hive, the less danger they will be in of suffering by cold. For which reason, while a populous Stock will remain healthy, a poor one shall be perishing. One hive shall be thrown into a useful lethargy by the same cold weather, which would scarcely diminish the heat of another. And whilst the Bees in one hive, shall be consuming their provisions, those in another shall be expiring with cold.

711. From hence appears the necessity of a moderately sized hive (viz. half a bushel) for their winter residence, for if too small they will, in our common winters, be too crowded and too warm: or if the hive be over large, they will not be numerous enough to keep up the salutary standard of health

sufficient to counteract a cold, damp, and noxious air. Many have been the inventions of ingenious gentlemen to preserve Bees in this healthy medium. It may be useful to give a few remarks upon those of most note.

712. And first of placing Stocks in ice-houses. The impracticability of this method with respect to general use needs scarcely to be pointed out to any one; it is sufficiently obvious at the very first view. None but the opulent possess any; and it is by no means probable, that any nobleman or gentleman in the kingdom will permit the farmers and cottagers to deposit their Bee Stocks in their ice-houses. The benefit arising from it also, would not repay the trouble, even upon the supposition of a more certain preservation; which yet is very doubtful: for unless the Bees of each Stock were very numerous, the icy coldness would certainly congeal their fluids beyond the limits of a future dissolubility.

713. The next method, and which seems more feasible*, is that of surrounding the hives every way, with dry earth or sand, between hurdles, or in casks, with a little trunk to extend beyond the earth as a passage for the Bees: a pan of honey, properly covered being first placed underneath the hives.

714. To this it may be objected, that a good Stock by this treatment will be kept

* *Natural History of Bees.*

too warm ; so much so indeed, that unless the winter prove very severe, the Bees will not be in a torpid state during any part of it, and consequently consume a large quantity of honey : which had they stood exposed to the weather, would have been saved. On the contrary, should the winter be attended with a cold, damp, and foggy air, both the good and the bad Stocks will be in danger from the absorbing power of the earth, which sucks in like a sponge such noxious damps, and thus the hives will be filled with putrid exhalations, together with the confined and putrid perspiration of the Bees themselves. This may be seen, though in a much less degree, on the inside of the windows of box hives in such weather. Under such circumstances how is it possible for the Bees to be otherwise than weak and sickly ? And indeed this will be found to be the case ; the poor insects are afflicted with the flux, and being too weak to go abroad to empty themselves they soil each other as they hang, and also the floor ; by these means the vicious quality of the confined air being increased, the whole community at length becomes infected ; and the Bees perish by the very means that were intended for their preservation : some of the more vigorous lighting upon the floor, become immediately so chilled, and so besmeared with the clammy excrement that, not being able to rise, they presently expire. Upon the whole, this appears too hazardous for public use, to say nothing of the trouble and expence.

715. But further, supposing they are hereby kept so *warm* and dry as to obviate these inconveniences, will they not suffer equally by over feeding? And will they not also consume more supplied honey, during the winter and spring, than the profits arising from them will counter-balance, should they prosper?

716. Another method has been proposed of shutting Stocks up in a dark, cold out-house, from the middle of September to the middle of April,* as an improvement upon Reameaur's method of inclosing them in casks (713).

717. This no doubt is much more practicable: but from many experiments I tried this way, I perceived not the least superior advantage; and more frequently the contrary. To which I will add that the keeping them entirely shut up, and inactive for seven months, is by no means what is wanted: Three months, at most will suffice for their indolence. But to take four months more of their breeding time, when they generally are anxious to repair their winter loss, by raising a young and sturdy brood against the harvest of honey, seems a very preposterous scheme of management. The author was certainly too precipitate in publishing a method founded upon a single experiment, and that not in his favour; for he allows, that if his mode should be eligible, the degree of care necessary in conducting it,

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* Article 15th, of *De Re Rustica*.

can scarcely be expected from servants and gardeners, who have many other things to attend to; and I add much less can it be expected from farmers and cottagers; besides, this gentleman did not consider, that the Queen often begins to breed the beginning of February, (if the Bees have liberty to fetch in farina); and during this month, and the succeeding one of March, there is generally a prodigious increase of young. It is commonly believed that a Bee is twenty days in hatching, and that the maggots are fed with fresh farina, without which they perish. Therefore if the Bees be confined until the middle of April, it will be twenty days before a single Bee is bred, which brings it to the 5th of May, and consequently there must be a loss of more than three months brood, that is to say, of a complete Swarm: for many Swarms rise in April, and even at the beginning of it, in favourable seasons. Whereas by the shutting-up method, the Swarms must be very late, and frequently there will be none at all. Nor can the three months loss of time be ever regained, so as to render such a Stock equal to one that has got so many thousands of young vigorous Bees ready to collect the honey as soon as it appears; while they themselves are chiefly employed in rearing brood; and have but few labourers to spare for other work.

718. Besides, however such Stocks may be confined, yet whenever the air is warm, it will pervade their hives, and rouse the Bees
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to action. They will then, by their discontented notes, shew how impatient they are of the constraint; and how eager to taste the sweets of the fresh air, to empty themselves abroad, and to renew their labours at the time appointed by nature herself.

719. From what has been now offered, the inference seems to be, that bad consequences must arise from shutting up Bees indiscriminately. Perhaps, however, in extraordinary frosty weather, or deep snows, it may be of service to stop up the door-ways of hives, as they stand; leaving only a small air-hole, and taking care that they be all opened again as soon as the frost breaks.

720. Having tried a great number of experiments to ascertain the best method of preservation, it appears to me that a good Stock, viz. one well filled with honey and numerous in Bees, in a sound hive, and covered with a pan, hackel, or the like, will stand our usual winters, without any detriment, and be more healthy, than by any other treatment. But when the frost is uncommonly severe, a sack, bag, or pea-halm, thrown over them, during its continuance, is all the additional attention necessary.

721. The recital of some observations will illustrate this more distinctly. In the hard frost, and deep snow, of January 1776, the barometer was between twenty-nine and thirty degrees; and the thermometer from fifteen to twenty-eight; some days it was at the lowest numbers; and the weather was more intensely

tensely cold than in 1740. During this frost two of my box Stocks, having no additional covering, perished. Two weak Stocks, in straw hives on stands, suffered the same fate; these had no covering except a plumb basket. All my other Stocks being rich, survived the severity of the winter and flourished abundantly.

722. It is worth notice, that one of the boxes that failed, had, notwithstanding, plenty of Bees and of sealed honey; and, what is still more extraordinary, the honey was liquid and transparent, at the termination of the frost, when I took it. Upon examination I found that the top of this box had warped, and thereby let in too much cold air.

723. In confirmation that severe frost will not injure Bees, we appeal to Siberia and Russia; where the winters are many degrees colder than any we have; where the hives are formed of the bark of trees, which are not so warm as our straw hives; and also, where Bees inhabit hollow trees, as with us; and yet, notwithstanding all these seeming impediments, are known to thrive; but whether, equally with ours, hive for hive, remains to be yet ascertained.

724. Frost is undoubtedly beneficial to the Bees as well as to the owner, while only so severe as to keep them motionless during the winter; for in this case most part of their honey will be saved; as they will not be capable of feeding, till near the return of the flowery sweets furnishing a fresh supply. Early Swarms

Swarms are likewise caused by this situation. But the instability of our climate, and the frequent and often sudden transitions from one extreme to another, prove more fatal to the delicate constitutions of the Bees than a series of any one kind of weather whatever. Valetudinarians among us too frequently suffer from the same cause.

725. In contrast to the foregoing observation; the spring of the succeeding year viz. 1777, was too cold for the Bees to collect any farina; I did not observe them to carry any in until the 16th of March, and then but little, and thus it continued until the latter end of April. This prevented the usual increase of brood. Nor indeed was the summer more propitious for the collection of honey. In the beginning of May several weak Stocks died, and the weather permitted little or no foraging till the 26th of May, till which time my Bees all partook of a general feeding, or common table (760). Most part of June was cold, the 21st of which a weak Stock died. So that I was obliged to renew the feeding, and continue it until July: the last day of which was so cold, wet, and windy, as to require fires being made in the parlours. And yet, on that day, a neighbour's Swarm rose. The whole summer proved so unfavourable that none of my Stocks got a fourth part of what would be necessary for their winter store. To complete the misfortune, the ensuing autumn and winter were also very unkindly, being replete with damp

damp foggy air: this, as all the Stocks were very poor, and scanty of numbers, affected the weakest very severely, causing a fatal purging, which destroyed many of them before I could find a remedy. The following succeeded to my wishes, and is the more valuable, as it is within the reach of the meanest cottager.

726. Incorporate two or three weak Stocks into one (409, 629), joining them to that which has the most honey. This operation should be performed in a warm room, if the season be very cold.

727. The stock-hive is then to be set upon a very clean and dry floor, on which coal-ashes (or, where these cannot be procured, wood-ashes will perhaps do) are to be laid about an inch thick, and over these clean dry straw. This management keeps the hive sufficiently dry and warm at the bottom, and when the Bees happen to dung, it passes among the straw, so as not to soil or chill them when they fall down, or alight. At the same time the hives must be well covered with sacks, cloths, pea-haulms, or the like, so as to keep the whole hive moderately warm: but a small opening is to be left for their passing out, whenever the mildness of the air or their occasions invite them. As the straw will keep the edges of the hives hollow from the floor, where pans are not used to cover them, in lieu thereof bricks or large stones must be laid on the tops, sufficient to keep the hives close down to the floors.

728. By

728. By this simple and easy management I preserved all the rest of my Stocks, and they requited me by their future prosperous labour. Flannels or woollen cloths laid on the floors of the hives, were found of no service. The straw and the ashes seem the best antidote to the pernicious effects of cold foggy air, which I take to be the only *one* that is dangerous to Bees; preserve them from this and keep your hives full, and the frost will bite in vain.

729. Boxes are not near so warm as straw-hives, therefore in hard weather they should have a bag or straw laid over them. But a medium must be observed, not to keep them so warm, as to be in motion.

730. There is no sort of danger in permitting the Bees to sally out as they like. They are the best judges of the degree of cold they can bear. The only danger is when the ground is covered with snow, and at the same time a smiling sun invites them out to taste its benign influence; but no sooner are the unfortunate Bees out, than they behold the face of nature intirely changed, they are confused and confounded, they fall, and are immediately chilled to death by the snow. The remedy is to shade the door-ways from the rays of the sun, during this weather, or stop them up, leaving only air-holes until the snow is entirely gone.

731. When Bees have fallen to the bottom of the hive, and seem motionless or dead, it is a sign the Stock wants more warmth: in this case,

case it will perish, unless immediately removed into a warm-room, and placed near the fire until the Bees begin to revive, then stop up the door-way. so that none can come out, and at night put them on a prepared floor (726) and cover them up warm.

732. Mr. Wildman directs that to preserve the Bees in one of his boxes, which has windows in three of the sides, the glass is to be taken out in October, and pieces of blotting-paper, or soft flannel, placed in lieu thereof. This appears to me a troublesome and needless business; for my boxes, with like panes of glass, stood in my Bee-house (which is not very close) during a frost that was severe enough to freeze water in the house, and yet received no harm: though nothing was done but covering the box with a bag: neither is it necessary to have any slips of wood placed against the glass to prevent the Bees from fixing their combs thereto. The glass will bear the pressure of the combs without such assistance: which will also prevent that perfect inspection for which the windows were chiefly intended. Perhaps Mr. Wildman trusted to theory, and did not try a box without those precautions. Hence it is that the world is pestered with theoretic deductions, unsupported by practical demonstrations.

733. It is very uncertain whether a weak Stock can be preserved by all the pains, expence, and care you can bestow; for it is an hundred to one, but that it will be labour lost; supposing it succeeds, the produce of such a feeble

a feeble Stock the next summer, either as to swarming or honey, will not be equal to the expence and attendance; nor adequate to what they would have furnished, if they had been united to a good Stock. It must be folly to prefer a hazardous chance to an apparent certainty; for which reason it has been directed (627) to keep no weak Stocks, but to incorporate them in the autumn.

734. Bees in weak Stocks may not unaptly be compared to a young trader, who from the ill-judged pride or parsimony of a parent is placed with a small capital, in a business that required a large one; but the means being disproportionate to the end, a bankruptcy is inevitable; notwithstanding the most assiduous and constant exertion of skill, industry, temperance, and frugality.

735. We come now to the article of *Feeding*; which in some instances is absolutely necessary; for it may sometimes happen that a summer (such as was that of 1777) shall prove so very unfavourable as to furnish little or no honey; consequently no Stock can have a sufficiency for the winter.

736. This is a trying case, for being both weak and poor, they demand our utmost care: they will require to be kept warm, and to be constantly, though moderately fed. Where there are several poor Stocks, this will be very troublesome, and uncertain in the event; for if the feeding happens to be neglected but two or three days, it is most likely that they will all perish, (752).

737. But

737. But by uniting several of these together (even at that season) this attendance is greatly lessened; and the Bees being also sufficiently numerous to keep up a comfortable warmth, they can descend without danger, to partake of the daily bounty bestowed upon them, and thereby escape those two formidable enemies, cold and hunger.

738. The mode and matter with which they are to be fed, require a careful discussion, as errors in these have done much mischief. Bees have been fed, with one or more of the following articles, according as whim, superstition, or fancy has directed; salt, bean-flour, sweet-wort, treacle, beer-grounds, dead birds, toast and honey, fruit, sugar, honey, and farina, with many others that I suppose have not come to my knowledge. Out of this farrago I shall only remark upon honey, farina, and sugar; the rest I consider either as useless or pernicious.

739. Several late authors have supposed honey the only and best food for Bees. This Monsieur Reaumur disputes, from the instances of Stocks dying, tho' surrounded with combs of honey; from whence he draws the conclusion, that honey alone is too lax a diet unless assisted by farina, which he characterizes as the *true bee-bread*. I apprehend the objections are as great against the farina as the honey; for if farina be absolutely *necessary*, how is it that more Bees die in spring, when plenty of fresh farina may be procured, than at any other season of the year? Many of

my Stocks have often failed, although they had a sufficiency both of *honey* and *farina*.

740. Besides, I have often supplied poor Stocks with double the quantity of honey to what any of my other Stocks had in their hives, and yet they perished in the spring.*

741. As honey served rather to increase the malady than cure it, I next tried sugar, both of different sorts, and mixed with water and with ale, boiled and unboiled: but all was found ineffectual, though the Bees at the same time were properly secured from cold. I then concluded the error must arise from too great a profusion in the supply of the food; taking the hint from

* Perhaps the following experiment, as being new, may not be unpleasing to the reader. To supply the poor Bees (as I then thought) in the best manner, I hung combs of honey to the bars of an empty hive by bits of very narrow tape: at first I was anxious lest they should gnaw the tapes asunder, before they had repaired and fixed the combs; and thereby let them tumble down to the bottom and crush many to death: however, they agreeably deceived me; for they first fastened the combs in their usual manner, and then gnawed the tapes asunder, and drew them out of their hives, ten or twelve of them at a tape, like sailors pulling at a rope. This experiment I repeated several times, with always the same result. Here it might be asked, how came the Bees by this sagacity? must they not have reasoned upon the case, and that such a singular one as neither they nor their predecessors had ever seen before. Was it instinct? or was it not rather the effect of thought? How infinitely diversified may this thinking something be! from the lowest degree of animation to that of a Newton; and from a Newton, by imperceptible gradations, to that of angels and archangels, even to infinite incomprehensibility! But this is a point of too much sublimity for mortals to reach.

the experiments in which the Bees died, though furnished with combs enough to support two populous Stocks.

742. An experiment of Reaumur's, seems to fix this point beyond dispute. "Some Bees were placed in a hive without leaving them any honey-combs, or even the liberty of seeking their food abroad. To compensate for this they were supplied with pure honey. At first they were fed *sparingly*, which kept them alive above three weeks: however, I was afterwards too bounteous; they eating *so much*, that they soon had *purgings*; they wetted one another; and some days after, they all died; and were as wet on this occasion as as if they had been dipped in water thickened with honey."

743. From these instances, we may conclude Bees are like some creatures of a more noble species, who, not contented with a temperate enjoyment of abundance, feed to excess, and thereby lay a sure foundation for numberless diseases, often terminating in an untimely and painful death.

744. Thus the Bees, allured by a sudden and too large supply at once, and obtained without either labour or pains, gorge themselves so as to bring on a fatal laxity; the very disease your care and kindness intended to prevent. It is probable, however, that the purging does not always arise solely from excess, but sometimes from a previous weakness, attended with a retention of the perspirable matter,

occasioned by a damp cold air. The Bees, incapable of disengaging themselves from each other, are under the necessity of emptying themselves as they hang clustered together, thereby soiling those beneath; the whole cluster at length becomes infected; the floor is bedewed with the excrement, which besmears those that fall on it; and at the same time the air of the hive is rendered more noxious; which hastens the destruction of the whole.

745. For the cure, Reaumur directs a comb of crude honey (by which he means farina) to be given to the sick Bees; but this I have found by experience to be of no real benefit. Rusden recommends salt and honey; but so far from liking a composition of this sort, they will be displeased with the offer. It has been asserted, that Bees will eat salt, and that they thrive best near the sea. It may be so, but not because they suck the salt water; it is not uncommon to ascribe effects to wrong causes. I have often tried them with salt, and with salt-water; but instead of pleasing, it manifestly offended them. The only effectual method of cure is to take away the cause; to keep none but populous hives; and, if there be occasion, to feed them, though but sparingly.

746. Whenever a number of Bees are seen dead at the bottom of the hive, it is a sign that their situation is either too cold, too damp, or that they are famishing (772). Tho' sometimes Bees may be found upon the floor, that have died merely of old age; far

as they enter the stage of life at different periods of the spring and summer, they will depart from it also in all the various seasons of the year. Nor hath the brightest genius, by the deepest researches, yet discovered a specific to change the decrepitude of age into the blooming vigour of youth and beauty. It is divine temperance alone that is able to procure a happy longevity, though it cannot communicate immortality.

747. Bees may be fed either with honey or sugar. The last answers full as well, if not better, than honey. I generally feed with sugar, as being much cheaper here than honey. But in some counties it may often happen, that honey is not so valuable as sugar, consequently the former is to be preferred.

748. Honey, after it has been some time taken out of the combs, becomes grainy and hard; and is then not digestible by the Bees, unless reduced to the same liquid state as when taken from the hives. This may be done by putting a quarter of a pint of *mild* ale to a pound and an half of honey, and mixing it well together; this will be of a similar consistence with hive honey, and will not grow feedy again. Warde directs water, (perhaps the Doctor was a water drinker) but I know by frequent trial, that ale is more agreeable to the Bees; not that they will be tipsey with it, but it acts on them as a cordial, gives them more vigour, they thrive upon it, and look plump and shining.

749. If sugar be used, it should be of the coarsest and dampest kind; that which feels sandy or grainy is improper, and for the same reason as grainy honey. For as the Bees receive their food by licking it with their tongues, as dogs lap, and not by sucking or grinding, therefore when such sugar is given them, the hard grains are left until a moist air dissolves them. The sugar must therefore be damped with a little ale, not boiled, nor with so much as to make it run. Sometimes, however, in the early part of the spring, the Bees of a Stock are weak and sickly; they then require more of the cordial quality of the ale, and cannot feed on the sugar unless made as liquid as the honey; (I speak from experience) but as the spring advances they grow stronger, and require it to be thicker.

750. The sediment of treacle casks, or the grounds of beer, will give the Bees a looseness, so will sweet-wort, if given in great quantities and often; but a little, when you brew, will be an acceptable change.

751. That *ale and sugar* will preserve Bees, seems evident from an experiment made in May, 1773. The greater part of that month had been wet and cold, after a long season of moderate frost and sunny days. At that time there was plenty of borage, apple, and other blossoms; yet two of my Stocks, that were full of Bees, were near perishing of famine; some hundreds lay on the ground before the hive, living, but too much chilled to rise. They were taken up, and carried to a proper distance

distance from the fire, where they presentl^y revived. I then fed them with sugar and ale, and returned them to the Stocks, which were constantly fed with the same, though but sparingly, until honey-gathering commenced; and they afterwards amply recompenced me for my assistance.

752. I have at other times treated Stocks in the same manner. But what ascertains the propriety of this measure, beyond a possibility of doubt is, that having only neglected to feed them three or four days they have perished. Doubtless, this is attended with some trouble; so is feeding poultry and pigs: let the farmer's wife refrain from it three or four days, and see how fat they will be.

753. The manner of furnishing the food becomes our next consideration. Warde condemns the country dames for what he thinks a very destructive manner of feeding. But I have tried both his method and theirs, and found my Bees died when fed as he directs, while the good women preserved theirs by their usual means.

754. But to be more particular: the setting plates of honey under hives is attended with many inconveniences. Lifting the hive up, in order to set the plate under, and afterwards to take it away, greatly irritates the Bees; and each time the Apiator will be stung, as also some of the Bees crushed under the plate, and under the edge of the hives. Also as the combs in general extend down to, and are fastened to the floor, there is con-

sequently no room for the plate to stand under without damaging the combs, or preventing the hive from setting close to the floor. Besides which, the method of laying a paper with holes in it over the plate of honey, is certainly an improper one, as the paper will be apt to slip aside, or wrinkle up, so that the Bees will get under, and numbers of them be smothered in the honey. Old combs set under, is a preferable method to the above, but is not free from some of these objections.

755. Mr. Wildman contrived a circular little box, with a mouth to it, to enter a little way into the door-way of the hive. I dislike it, as being too expensive; as standing exposed to the cold out of the hive; as the honey is to be covered with paper, which makes it liable to the foregoing objections; and lastly, as the Bees are obliged to leave the warm hive to feed in the box.

756. I have tried perforated tin tubes, let into the top of the hives, and into the sides; tin trunks, and a variety of other contrivances, but find none equal to the simple, easy, and cheap method of kexes: these are troughs made of the joints of any plant that is pithy or hollow; those of elder are the best of all for this purpose. Select those joints that are longest, and not more than one year's growth; take the rind or bark off, as also the upper part, 'till the joint is shallow enough to slide in at the door-ways of the hives, leaving about two inches at one end uncut, as a handle, and at the other end a little of the pith, to prevent the

the sugar or honey from sliding out into the hive. Make the under part a little flat, that it may rest steady, and not be liable to turn aside, which it will be apt to do if left in its natural roundness, and thereby the hive floor will be soiled with the sugar, to the detriment of the Bees.

757. As these little troughs are but narrow, the Bees will stand on the edges, and feed out of them, equally as safe as at their combs; and as their length is six, seven, or eight inches, their food is introduced into the warm part of the hive. By these means they are not too much chilled by any degree of coldness in the air that makes it necessary for them to feed. For in a very cold state of the atmosphere they are torpid, and take no food at all (704).

758. One of these troughs, or kexes, full, is enough, in general, to supply any Stock twenty-four hours. They should be placed in the hive every evening, and changed the next. Such Stocks as do not nearly consume the quantity, should have less given them at a time, that there may be no danger of their overcharging themselves (741).

759. This method of feeding is only necessary when the weather is not mild enough for the Bees to come out of their hives to feed; or when you want to supply only a particular hive or hives; or, if feeding become necessary before the Wasps are gone. But be sure never to place the food at the entrance of the hive; for, if there be any poor Stocks in the neighbourhood,

bourhood, they will be allured to partake of it with your own Bees, and thus occasion the death of many every day by their quarrels. This may be called *Separate Feeding*.

760. But to shorten the trouble, when the weather is sufficiently mild, either in autumn or spring, as occasion may be, and the Bees seem active, all the Stocks may be fed at once; which is called *Public Feeding*. This is best done by procuring a piece of some compact wood, as ash, oak, &c. about eight inches long, four wide, and an inch thick at least; let this be made full of circular holes by an auger, or rather a center bit, each hole to be half an inch in diameter, and a quarter of an inch distant from each other, and as deep as the wood will admit, but so as to hold water. If there be any inconvenience in getting the holes made, the board may have grooves cut out, of half an inch in width, leaving wood enough at each end to stop the sugar from running out; or, if cut quite through it must be stopped with putty.

761. These instruments, (which I shall call feeders, especially the first kind of them, as in some degree, resembling honey-combs) the Bees will cordially feed out of without danger of besmearing themselves, which they generally do when platters or plates are set, however well regulated; and without occasioning any dangerous quarrels among them; for though they will not stab each other, yet they will sometimes box and bite, and tumble one another about among their food, so as to destroy

destroy many lives, when they cannot get readily at it. The sugar or honey may be made thinner for these public feedings than for the private, so thin indeed as to pour thro' a tea-pot, which will be the most convenient instrument to fill the holes with.

762. These feeders should be set upon a stand of some sort, about the middle of the Apiary, and placed under an old hive, pan, or the like, leaving an ample vacancy for their entrance at the bottom; for if not protected from the wet, a sudden shower may prove destructive to many hundred Bees. One of these feeders, filled, is sufficient for twelve Stocks for a day's supply.

763. There is no precisely determining the quantity of honey or sugar necessary to support a Stock through the winter and spring. The numbers are so different in different Stocks, and the weather so various, that one year may require double that of another. Sixteen pounds of sugar and one quart of ale sustained twelve of my poor Stocks through the autumn and until the succeeding May; at which time they deserted the sugar, and began to provide for themselves.

764. By this method of feeding the whole expence of feeding twelve poor Stocks thro' a very dreary season, amounted only to five shillings and eight-pence, whereas six, eight, or ten pounds of honey have been given to single Stocks, upon another plan, and yet such Stocks perished.

765. In

765. In the spring all Stocks should be examined, by poising them between your hands, whether they be light or no. This should be done as soon as they begin to breed, for afterwards, the additional weight of the brood and farina, will induce you to think they are rich in honey, when at the same time, they may have little or none in their hives, and may perish for mere want, *seemingly* in the midst of plenty. But by examining them early, you will be certain to distinguish such as will want your help, 'till honey pasture comes in, from those that do not.

766. If any of your neighbours keep Bees, their Stocks will partake of the public treat, equally with your own. In such a case, and when your Stocks are poor, and *must* be fed, the separate feeding is to be preferred, except when the air is too cold for any strange Bees to come so far from home. You may easily see, by the flight of the Bees, whether any come from the surrounding quarters.

767. Public feeding will be extremely dangerous to your Apiary, if used before the time of robbing be over, as it will intice the robbers to assault some of your Stocks.

768. There is no danger of your own Bees coming out to feed in too cold weather; mine have publicly fed in December without damage; though in other years May and June have proved so unfavourable, that none would venture out, though at short allowance, and greatly pressed with hunger; but I have known that when they have been out, and fed

fed for two or three hours, yet upon feeling the air too chilly, they have returned, though in the middle of the day, and the sun shining out.

769. Where a good price is made of honey; feeding in autumn and spring will always be advantageous, although your Stocks be well furnished; for the more sugar and ale they consume, so much the greater will be the saving of the Stock honey; they will swarm the sooner, and the sooner fill an additional hive; or should the inclement season continue longer than usual, your Stocks will be in security and plenty while those of your neighbours are starving. Here then is a management doubly advantageous.

770. The continuance of feeding, must however be regulated by the commencement of honey gathering; for although the Bees will in general neglect the sugar as soon as their favourite flowers appear, yet they will not always, but sometimes carry in both honey and sugar, and thereby debase the quality of the comb honey. As soon therefore as they seem to *sight* the sugar, the feeding must be discontinued.

771. Whenever it is observed in the spring that the Bees of any hives do not fly out as others do, such may be concluded to be famishing, or on the point of dying: turn up the hive, and if they do not stir, remove them to the house fire; as soon as they begin to crawl give them a kex of liquid food, and stop the passage so that none may come out;

out; at night set them in their place again, cover them warm, and continue to feed them every day, as long as necessary: but, if on turning them up they appear lively, and have honey, but have ceased from working, it is a sign they have lost their Queen, and therefore must be united to some other Stock (376), or you will have neither honey nor Bees left.

772. The Queen's death is often occasioned by age, disease, or some accident. If at this time the Stock be numerous and rich, the Bees will desert the hive, and take their treasure with them (636): but if *they* should not, other Bees or vermin will, unless the Apiator be sharp-sighted enough to prevent them.

773. When Bees fly in an idle manner about their hive in the spring, when those of the other Stocks do not, it is sign of poverty, and they will require succour 'till the honey season commences (765, 752). At any time if you see the wax crumbled on the hive floors, or about the door-way, it is a token the Bees are in some distress; turn the hive up, if very light, and without honey, but the floor dry, and the Bees lively, it denotes famine; the Bees however may be saved by proper feeding or uniting.

774. When Bees are motionless, merely through hunger, heat will not restore them; but, when the hive is turned up, if some sugar or a small quantity of liquid honey be dropped among them it will recover great part of them.

775. When

775. Whenever many of your Bees are observed to fly about the door, with a lamenting tone, in spring or autumn, it is to acquaint the Apiator that they are in distress, and want his charitable assistance: by inspecting the Stocks, and by the unusual number at some of the door-ways, you may know which Stock wants succour: this must be immediate, for the next day may be too late.

776. As soon as there is plenty of farina in early spring, and mild weather to favour the collection of it, the Bees will breed apace. Having thus a continual increase of many mouths, if there be not plenty of honey in store, or if the season continue for a length of time propitious for breeding, but unfavourable for honey-gathering, the Stocks, especially the poor ones, will be more in danger than at any other time: hence it is that such numbers of Stocks perish in May. The prevention is a cautious and timely feeding. Hunger, which increases the fierceness of many ferocious creatures, has a contrary effect on the Bees, causing them to be very tame, so that a hive may then be turned up without their offering to sting.

777. The way to avoid having poor Stocks is to be so moderate in their number, that they starve not each other, through the want of pasture to supply them all (566). By these means, though less in shew, you will have more in substance, and be always a successful and prosperous Apiator; without being or fearing either a witch or a conjuror.

778. If

778. If Stocks at any time be removed from one part of an Apiary to another, the stand or door-way from whence they are taken, must be disguised by a mat, cloth, or the like, or the Bees will waste much time, and many be lost, by returning to the same stand again.

779. The slits or openings that are made to admit the sliders in the tops of the hives and box, should always be stopped up by small wedges of wood or of tea lead, to keep out the moth and other insects; unless in hot weather, when they may be open to let in the air, to keep the hives from being too hot.

CHAPTER XXI.

How to Extract the HONEY and WAX from the COMBS; with several new Methods of doing it.

780. **T**HE combs should be taken out of the hives as soon as possible, and the honey drained from them while yet warm, as it will then run more freely. To further this intention, the hives should be brought into a warm room, if the air be cool, but

but where no Bees can enter: for otherwise the smell of the honey will attract multitudes to their destruction; and likewise greatly interrupt the operation.

781. In my open top hives and boxes, that have but one spleet, a notch must be cut in the edges of the combs, that the spleet may be taken out without damaging any other part of the combs; for which purpose one end of the spleet must be cut through, close to the side of the hive, and it may then be easily drawn out. The combs are then to be loosened from the sides of the hive, by being cut through at their edges by a long thin knife; then lifting up the body of the hive, all the combs will be left standing upon the barred top; from which they may be separated by a knife, so as to come away whole. This advantage alone in my hives will more than compensate for the extra expence.

782. If there be any Bees upon the combs, when taken out, they should be brushed, or rather blown off, and if besmeared with honey, washed in two or three waters made a little warm; being then laid on a sieve, and placed in the sun-shine, or before a fire, they will revive again, and fly to their respective homes.

783. Those parts of the combs that are empty should be cut off first, and those that are black and drossy, laid by themselves; as must also those that have farina; but if any have brood, great care should be taken not to crush them, as they must be put into an
Y empty

empty hive (588), and placed over any Stock that most wants strengthening.

784. Then those parts of the combs that contain virgin honey (830) are to be cut out, and drained by themselves; for there are scarcely any hives but what have some portion of virgin combs in them.

785. Great care must be taken that no maggots, or the juice of them, on any of the farina be squeezed out among the honey, for both communicate a bad flavour and quality to it; therefore a little honey had better be lost; or those parts which cannot be separated without foulness, be returned again for the Bees to feed on; by which in the end no loss will be sustained.

786. It is usual to lay the combs on sieves for the honey to drain through; but the honey is too long in passing through them, and thereby the most volatile and fragrant parts are exhaled.

787. A better apparatus is a frame of wires adapted to the size of your pans, each wire about one inch distant from another; through these the honey will separate much sooner. Lay the combs thereon, cut through the cells about the middle and turn them; in three or four hours the honey will be run out; then cutting through the upper parts as they lay, turn them also downward, and the whole will be soon finished. Large tin dripping-pans are to be preferred for this purpose, as iron pans have generally some rust on them, and earthenware

ware absorbs or sucks in a great deal of the honey, which *tin* does not.

788. As several small portions of the combs will fall between the wires along with the the honey, a bag must be provided of a conical form, that is, wide at top, and tapering to a point at bottom; it is to be made of fine flannel, or such canvas or cloth as the dairy people strain their milk through. This is to be hung between two chairs, or to the ceiling, and a jar, or other proper vessel set underneath to receive the honey as it runs through. The honey is to be poured out of the draining pans into these bags, whereby it will be entirely freed from every particle of wax, much more so than if passed through hair sieves in the common way. Care must be taken that the bags be not hung so near the fire as to melt the wax, for that will spoil both; but a moderate degree of heat will greatly forward the operation; and the honey will be the better the less time it is exposed to the dust and the air.

789. In large Apiaries, where perhaps fifty or a hundred Stocks are taken up at once, the press is by some used, without any previous drainings; which in the common way, would be a very tedious process, for such quantities. With submission, however, I should imagine, that if a number of large tin pans, with sticks only laid across them, were used, the superior goodness of the honey would amply repay the first cost of the pans; and the process would be accomplished in a very

moderate time. By the press all the honey is made alike impure; which gives too much room for the odious character of sophistication, though perhaps the accusation of a want of neatness might be more applicable. If equal delicacy were observed in the extraction of honey as in the management of the dairy, it would fully pay for the trouble; and perhaps introduce honey once more to general acceptance.

790. The first running from virgin combs only should be reserved by itself, as being of the first quality; provided customers can be found to give a proportionable price. The next in value is that which drains from the other combs indiscriminately; and a third sort is produced from the combs when squeezed or pressed through the bags. This sort will be foul, and fit only for cattle, or some external use.

800. But where mead is made, it will hardly be worth while to press the combs; as they may be thrown into water for that purpose directly; or the combs, after pressing, may be placed, a few at a time, in the Apiary, in *dry* pans, and the Bees will take care that not a particle of the honey shall be lost. If a quantity of the combs be given them at once, they will suffocate each other among them. For the same reason the draining pans must be strewed over with straw, or herbs, &c. before they are given to them; otherwise, in their eagerness they will besmear themselves all over. These pans, &c. should be set under

der some shelter, lest a sudden shower wash the honey away and drown the Bees. If they are set out in a rainy day, it will prevent the neighbouring Bees from partaking with your own.

801. The pots or vessels of honey should remain a few days to settle before they are closely covered for sale; for if they contain any small particles of wax, these will rise to the top, and are to be skimmed off. The good combs are to be kept apart from the bad; as they are intended to be melted separately (807).

802. The usual method of separating the wax from the droffy part of the combs is to *boil* them in a proportionable large quantity of water; which is to be frequently stirred to prevent the wax from burning: when it has boiled sufficiently to have thoroughly melted the combs, it is to be put into *hair* bags, such as bottoms of sieves are made of, and then pressed by some convenient instrument so long as any wax passes thro': the droffy part that remains may be re-boiled in fresh water, and re-pressed, whereby more wax will be obtained.

A vessel of cold water is to be so placed as to receive the wax as it comes from the press or bag, to cool the wax the sooner, and to prevent its sticking. The wax is then to be melted a second time, and pressed through bags made of cream cloths; after which it is to be melted a third time, and passed through bags made of still finer cloth. Lastly, it is to be melted again, without any water, and poured into pans wider at top than at bottom, so that

the wax when cold, may be turned out without difficulty: and not only so, but the smaller the bottom of the cake is, the dross will be more collected, and consequently the less waste made in scraping it off. This tedious method might be greatly shortened by first boiling the combs in water, with each quart of which half an ounce of aqua-fortis has been previously mixed. After being boiled, the wax will be within two or three inches of the top, intermixed with farina; but a considerable quantity of dross will be at the bottom. If the whole of this mass be suffered to stand until quite cold, the dross at the bottom may be cut off; and the remainder being so much more free from impurities, the wax will be far more easily extricated.

803. When the wax is in the mould, if there be any froth, blow it to one side and skim it off. The moulds or vessels it is poured into should be first wetted with cold water, to prevent the cakes sticking to them. The moulds are to be kept in a warm room until cold, otherwise the cakes of wax will crack in the middle. If they happen to stick in turning out, warming the vessels a little will loosen them so as to come out with ease.

It should be observed, that the combs ought not to be squeezed when put into the water; as they will melt the sooner, and the farina, and other impurities be more readily separated.

I would propose a bag made of flannel of a moderate thickness, as far preferable for straining

straining the wax through than either linen or canvas. It should be hung during the process as near the fire as possible without burning. A hoop should be fastened at the top of the bag to keep it properly extended, so as to receive the wax with the greater facility. Before the wax is put into the bag, it should be well and briskly boiled, and that for some time; otherwise the wax will not be sufficiently disengaged from the dross, farina, and skins of the maggots; with the two last it is so intimately united, as to be very difficult to separate. A vessel of cold water is to be placed under the bag, to receive the wax as it drops. The first running will be good, but as the flannel thickens, by the wax adhering to it, it will come through still more pure; and though from foul combs, will be equal to any of the wax from the virgin combs.

804. When the pores of the bag become so choaked with wax as to prevent its passing through, return the remaining gross matter into the boiling water again, and as much as can be scraped off the bag inside and out. To shorten the process it will be proper to have a kettle of water boiling by the side of the other to recruit its waste, and to boil the bag in, to clear it of the still adhering wax and dross; which will otherwise prevent any more wax passing through it; and this must be repeated as often as it becomes clogged. In the same manner sieves or bags of any other materials must be treated.

805. The separated wax must have all the water squeezed from it before it is melted to be put into the moulds: for the water will make the wax liable to crumble.

806. Some strain their wax through hair sieves; but these are soon clogged up, and then but little wax will pass, consequently there will be a diminution of the profit. Where Apiaries are very large, a press is generally used to separate the wax; and in some places it is done between hot irons.

807. A greater quantity of wax will be procured if the virgin and other yellow combs that have no farina or brood in them, be melted by themselves: for the fewer impurities there be, the sooner the wax will run from it; whereas if entangled with a large quantity of dross, the press having less power over it, the more difficult and tedious the separation will be. Upon the whole, whichever of these methods be taken, it is a very troublesome business, consumes much firing, a quantity of wax is wasted in the operation, and the drossy matter, which is thrown away, contains a considerable portion of wax.

808. Many and great were my endeavours to obviate these difficulties, which have puzzled me ever since I kept Bees; at last I hit upon the following *processes*, which I give to the public as the most perfect that have hitherto come to my knowledge. But it will be necessary, by way of introduction, to make some discriminating observations on *combs*. If we carefully separate the hard dark coloured or black

Each cell from each other, whether full or empty, they will uniformly be found to consist of a film or very fine skin, instead of a partition of wax. For Supreme Wisdom has induced the Bees with such economic sagacity, that as soon as a maggot has quitted its skin, they cement or hang it up against the waxen sides of the cell; and very likely several of them successively, until they become sufficiently strong to form a partition of themselves; the wax is then taken away and applied either to form new or to cover other cells: for the Bees in many instances are found to be extremely saving of their wax.

809. But in order the more certainly to ascertain this opinion, I boiled some of these combs, which were entirely empty, but not the least trace of any wax was found. The experiment was repeated with the same kind of combs filled with farina, and the result was exactly similar. To corroborate this fact still more, if several of these skins or films be twisted together, and lighted, they will burn like a candle, as many other substances of this kind will do, though not containing the least particle of wax; whereas, if we press together several of the finest virgin cells, and hold them to a candle, they will melt but not flame. To which we may add that these skin partitions do not manifest any waxen property, either to the eye or the touch; much less has farina any such quality when tried by fire. From hence it may be concluded, that we may as well attempt to extract wax from

from a pasteboard, as from such kind of combs. Therefore, that so very large a quantity of droffy matter may not prevent a more perfect purification of real waxen combs, they should be, previously separated by the hand, and thrown on the fire, to make the pot boil, as the best use they can be put to; which will much shorten both the trouble, time, and the expence of fuel usually bestowed upon this useless rubbish. People therefore need no longer wonder that the combs from old stock hives yield little or no wax; for if any be obtained, it is what covered the honey cells. This also shews the great advantage of a frequent change of hives for the acquisition of double or treble the quantity of wax, than can be procured by the old way.

Process the First.

For extracting Marketable WAX without Pressing.

810. Take a tin cullender, all the holes of which are *round*; the handles must also be off, instead of which fix across it a strong wire or iron bail, or a tin one like those of watering-pots; and if soldered on the inside, it will be most convenient. The cullender in size must be adapted to that of the pot or kettle you intend to use; but to go within side of it, as close to the sides as possible. Set the pot on the fire, with about three or four inches depth of water therein, in which is to be mixed single *aqua-fortis*, in the proportion of half an ounce for each quart of water. In
this

this put as many wax combs as will conveniently boil when melted. As soon as they begin to melt, they should be frequently stirred until all be thoroughly melted; let it then boil without stirring, that the wax may rise clear. It should be made to boil very briskly, during the whole process. As soon as the yellow froth rises, put in the cullender or sieve, and press it down in the liquor, until it be about half full; but great care must be taken that none of the liquor rise over the edge of the cullender, as that will foul what is therein, and spoil the operation. With a wooden, or what is better, a tin ladle, first dipped in cold water, lightly skim off the wax as it rises upon the surface, and put it into a narrow bottomed pan (previously rinsed in cold water) set as near as can be to the pot on the fire, and continue skimming the wax off as long as any rises, depressing the cullender in proportion as the liquor sinks.

811. Instead of a cullender a hair sieve may be substituted; but where a person keeps six or eight Stocks of Bees, it will be most profitable and convenient to have a tin vessel made on purpose to fit a due proportioned kettle or pot, the sides of which should be quite straight, so that when the *tin separator* slides down, there may be no vacancy for the farina to rise up between. The holes in this tin separator should be as numerous and small as possible in the bottom, and about two inches up the sides; the bottom should be quite flat, without

without a rim, like that of a quart tin pot, that it may press the dregs the closer down, when near the bottom.

812. When the liquor in the pan is nearly cold, the wax is to be taken out, and what dregs adheres to it scraped off. The wax is then to be re-boiled in a small quantity of water, and about a fourth part as much aqua-fortis as before to a quart; as soon as it boils take it off, and let it stand until cold. The wax will concrete at top, and the remaining dregs being again scraped off, may be further purified with other combs.

813. This process will not only extract the wax more completely than any of the methods generally used, but it is also much less troublesome, and in every other respect more eligible, for the aqua-fortis may be got for a penny an ounce, consequently that trifling charge is much over-balanced by the other superior advantages. As aqua-fortis procured from different places may not always be of equal strength, a consequent variation will be found in the process. The operator must therefore add or subtract in conformity. Some practice is necessary to form a judgment, or to conduct this or any other operation skilfully. Double aqua-fortis will not answer the purpose, either in this or any of the following processes, nearly so well as the single, and the wax produced will be of a pale dingy colour.

814. A less expensive method, though not so eligible, is to put the combs loosely into
a can-

a canvas, or rather a fine hair bag, tied up close at the end, and put into a kettle with a due proportion of aqua-fortis and water; a leaden or iron weight is to be laid on the bag to keep it down to the bottom. It must be made to boil so as to throw up the froth briskly, which is to be taken off as (810): a thick board with a handle in the middle is then to be put in, to press out what wax may be still adhering. It is afterwards to be treated as (812). It should be carefully observed that in these processes of skimming off the froth, what rises of a clear yellow should be reserved by itself, as often requiring no further purification. The more forcible the froth is thrown up, the purer it will be; and the operation the sooner finished: by this bag-method, full as much wax, if not more, may be obtained, as by any of the usual modes.

Process the Second.

815. *To extract Marketable Wax from the COMBS by a single Operation, without either straining or pressing.*

816. Take an earthen vessel, much narrower at the bottom than at the top; put therein a quart of water, and one ounce of single aqua-fortis, or the like proportion for larger or lesser quantities: stir them well together, and then put in so many good wax

combs as, when melted, will reach within a finger's length of the top of the pan; set it on a clear but strong fire, and as soon as it begins to melt, stir it about, and so continue until it boils, and even longer, if the combs be not all thoroughly melted; remove it then from the fire, and let it stand until it be cold.

817. The wax will be in a cake at the top, and the impurities underneath it: there will be two sorts of impurities; the lowest will be almost entirely dross; this is to be taken off by itself, and is of no value; the next will be a layer of dross, but with some wax intermixed; this also is to be taken off, (so as to leave the cake pure and reserved by itself; as also any foulness that may be on the top; both which may be refined along with more combs the next boiling.

818. Old combs that have wax in them, or other refuse that has been pressed, but yet retain a considerable portion of wax, may be thus treated, and will yield as fine yellow wax as the best combs; provided the combs or refuse have been previously pressed down, and kept in a close tub or vessel in a house for five or six weeks: which will occasion the *impurities* to ferment and rot, (the *wax* will *not*) and thereby disengage the parts, and dispose them more aptly for separation.

Process the Third.

To extract WAX from the COMBS by a single operation, in a greater degree of purity, and without straining, pressing, or the use of a menstruum.

820. Take the same kind of vessel as is used in Process the second, put into it about a quarter of a pint of water, to keep the wax from burning; then put in so many entire empty virgin combs, or at least such as are of a good yellow, as the vessel will conveniently hold; set the pan over a brisk but clear fire; as soon as the combs begin to melt, keep it stirring until it boils; then cease, and a clear yellow froth will rise on the side or middle. This is to be skilfully taken off as fast as it rises, and put into a pan previously set close by. The fire must be so managed as to keep the froth rising up, but not so fierce as to make it boil over. If it rise too fast, remove the pan to a less hot part, or damp the fire a little. The combs, when first melted, should only be sufficient to rise within three inches of the top of the pan, to prevent the necessary rising froth from running over; when the froth rises a little foul, return it out of the ladle into the pan again, and draw the foul scum aside from the part where the froth rises, or the whole will be spoiled; when no more clear froth will rise, take the pan off, and turn the remainder out into a vessel of cold water. It may be afterwards further purified
along

along with other combs, by the second Process. A shallow tin ladle will be most convenient for this business; but for want of that a basting-ladle with the top taken off, will do very well.

821. The pan that has the purified wax is to remain near the fire undisturbed, and with a cloth over it, until it is cold; it will then turn out a cake of fine wax (if it has been managed judiciously) and free from dross.

822. This Process may be very serviceable as preparatory to forming *white wax*; and for several other nice purposes, where great purity is required; and in fact is the readiest and cheapest method of extraction of any; but is restricted only to fine combs.

Process the Fourth.

To render WAX miscible with Water.

823. In a quart of water dissolve one ounce of pearl or pot ash; add combs as in Process the second, and boil them until melted: the whole will then appear of a milky colour, the wax and water being incorporated, and when cold will resemble cream. To restore the wax re-boil it with three times the weight of aqua-fortis as there was of ashes; hereby the wax will be extricated from the water, and resume its usual state, only of a paler colour than common. I give this Process as one that I happened on in the course of my experiments, not knowing but it might convey some useful *hint*, or prove of real service.

824. Doubt-

824. Doubtless, some ingenious persons, who keep considerable Apiaries, may add to the above improvements; which are but new to myself, and consequently not likely to be so perfect as time and experience may render them.

825. Combs should never be kept long before they are melted, for, though they be covered in a close box, the Wax-Moth will find a place to deposit its eggs in, and the young maggots will gain an entrance to the destruction of the combs: after which, turning to perfect moths, they will prove very hurtful to your Apiary.

826. A hive of combs yields but a small portion of wax, compared with the quantity of honey. A hive of three pecks well filled, and of not more than two years standing, may afford twenty-five pounds of honey, and not above two pounds of wax. Stocks, taken one with another, in the common way of management, do not upon an average afford above one pound of wax each.

CHAPTER XXII.

Characteristic and Medical Observations on HONEY.

827. **I**T has been already observed, that the perfection of honey arises from the superior quality of the flowers from which it is gathered (514) and also from the degree
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of care and cleanliness in its separation from the combs. The former is regulated by the situation of the Apiary for pasturage, and by the weather; for however plentiful the best of honey-flowers may be, if the weather prove too cold, too wet, or too dry, when they are in bloom, they can yield no honey; or what amounts to the same, the Bees cannot fly out to procure it; but the weather perhaps proving more favourable afterwards, when the best flowers are gone, and a more inferior sort are blowing, the Bees in this case are necessitated to collect from them. If a surloin of beef cannot be had, we must take up with a leg. Hence it is, that in some years, no fine honey is produced. And on these principles it may be supposed, that even in the same year, different Apiaries may produce honey of very different qualities, though the pasturage be equal, the difference arising from the weather being favourable to one situation, and not to another.

828. The honey that is generally sold in the London shops, is too hastily condemned, as being sophisticated with flour. To ascertain this point, I mixed with a small quantity of my finest honey, some flour, in different proportions; by none of which was it altered to the appearance of London honey. Therefore the difference must be ascribed to the nature of the places from which it is usually brought; that is to say, the heath countries. These indeed produce a great abundance, but, from the nature of the flowers,

flowers, the honey is but indifferent (507, 560); to this must be added, the gross method of extracting the honey from the combs by means of a press; which sufficiently accounts for its too common coarseness and foulness.

829. To explain this more distinctly, it must be remarked, that in Stocks which stand more than two years, the combs become black, and the cells foul, by the quantity of brood successively deposited in them. Not only so, but when a hive is taken up, there is frequently some brood or maggots in parts of the combs; as also farina, both new and stale. The taste of the maggots is like that of rusty bacon; and that of the farina, a nauseous bitter. If any of these therefore, through carelessness, be pressed out along with the natural impurities of the combs, and intimately incorporated with the honey, it is no wonder, that this becomes disagreeable to the sight and taste, and even unwholesome; nor that in general, it is disesteemed and neglected.

830. It is a prevailing opinion among country people, that all *swarm honey is virgin*. This proceeds from a supposition that a Swarm consists intirely of young Bees, and therefore their honey must be the best. But in neither case is this true. A Swarm consists both of old and young, equally with a Stock: but even admitting they were all young Bees, what difference can there be in the selection of the flowers between the old and the young? If there be any, however, it must be in

favour of the old Bees as more knowing and more skilful than the others. The truth is, none are virgin combs that have had brood or farina in the cells, whether it be in a Swarm or Stock. Now a Swarm breeds through the summer equally with a Stock, consequently great part of their combs, especially the central ones, are filled with brood, as well as those of the Stock. So that in both, it is only a part or portion of the combs, that contains true virgin honey; if by *that name* be meant honey of the *greatest purity*. The grand point therefore is, when the combs are taken, to separate the virgin parts from the other with the greatest care and niceness possible.

831. By managing Bees in the story method, the advantage in this respect is very great, as whole hives or boxes may be taken filled with *intire virgin* honey and wax: but which is always impracticable by the common hives and management, and in general by the collateral method.

832. It must be considered, however, that honey may be really virgin, and yet but bad honey in its quality. For, as before noticed, honey as collected by the Bees, in the first instance, is good, bad, or indifferent, according to the nature of the flowers from which it is gathered. And therefore a purchaser may be supplied with *intire virgin* honey, and yet be greatly disappointed. For instance, honey gathered from heath, and deposited in new virgin cells, will be true virgin honey: but

but as heath affords only that of a bad quality, the nature of the place where it is lodged cannot improve it.

833. As fine virgin honey is procured in much smaller quantities than any other, the price ought most certainly to be larger in proportion. Those who will not give a good price must expect to have an inferior sort imposed upon them instead of the best. But as few buyers are competent judges they are apt to think the demand exorbitant. If the seller be of tried honesty, and the buyer not avaricious, a confidence may be placed without danger of imposition.

834. Foreign honey is much extolled as being far superior to any produced in England. This in a great measure may be true, but not intirely; the wild thyme and rosemary of Narbonne in France; of Minorca; of Mount Hymettus, in Greece; of Hybla, in Italy, may be injured, while in bloom, by showery weather; and this opportunity being lost, the rest of their flowers will yield no better honey than our own country affords. Besides, as they have such prodigious quantities, it is very probable that the Apiators of those countries are not more cleanly or more careful in the extraction of it from the combs than the farmers dames of our own island. Shall old England's peasantry submit the palm of cleanliness to those of France or Spain, or any southern climate whatever?

835. It is possible to have as fine honey in England as the foreign, in any and every year,

by having a large garden planted with a great quantity of aromatic flowers. It may farther be remarked, that the foreign honey must greatly vary in its quality, in different years, according as the weather has been more or less favourable. The different apiaries also, as with us, owing to diversity of situation, and of management, cannot be supposed to produce honey always equally fine. Therefore, let us not be carried away by the "whistling of a name", but let our senses of smell and taste come in for a share in the judgment.

836. Honey when exposed long to the air, grows hard, rough, and seedy: to prevent which the Bees seal or cover the cells of honey with wax; as in this state it is to them quite indigestible. Not that all honey is alike in this respect; some years afford it of a more liquid nature than others; and difference of situations often has the same effect. If honey be kept in a warm place, it will ferment, and turn acid.

837. New honey is better than old, as it is continually losing some of its fragrancy, unless very closely confined by a bladder. That which is collected in the spring and summer is superior to that of the autumn; the clear than the yellow. That which has a kind of acid sweet than that which is wholly so. The best is light coloured, fragrant, and something aromatic, partaking of the nature of the flowers it was gathered from. The colour depends on that of the different juices
which

which yield it. Thus the honey collected from trees is higher coloured than that from flowers; and that from the blossoms of heath, darker coloured than what is gathered from any other flower.

838. For medical purposes honey is directed to be clarified. This is performed by setting a bason, containing the honey in a vessel of hot water, over a clear fire without smoke, and taking off the scum as it rises. If the honey be foul, this method will free it from the grosser impurities, but not from the lighter heterogeneous matters with which it is usually mixed, such as dust and farinaceous substances; nor from the juice of the maggots, with which it oftentimes is blended. Neither has a vapour bath force enough to effect this, nor even a violent boiling of the honey in a naked vessel. On the contrary, if the honey be really *virgin*, nothing will be thrown upon the surface by boiling, except froth; and instead of being improved by this management it will be robbed of its most essential excellence; viz. its aromatic fragrance, and be debased to a sugary flavour.

839. If honey be bought for virgin; it will be easy to discover whether it be really so or not, by clarifying a small portion of it. One exception, however, must be made, viz. that small portions of wax, notwithstanding all the care that can be taken, will pass through the hair-cloths with the honey in draining. This however generally rises upon

the surface, after the pots have stood a few days, and is easily taken off.

840. Perhaps the best way to purify honey is to inclose it in a bladder, and put it into hot water, until it be just fluid, and then to pass it through a thick flannel bag of a conical or funnel shape. The bladder will confine the volatile parts, and the rest of the operation being quickly performed, little detriment will be suffered. But care must be taken that it be not kept in the water until it is so warm as to melt the particles of wax that may be intangled in the honey. As honey partakes both of an acid and saline nature, the vessels in which it is kept, ought not to be (as is usually the case) glazed with lead; as is that called Delf, the cream coloured stone ware, and all the common earthen ware.

841. It is well known, that acids and saline substance will dissolve a portion of lead, if they be any considerable time in contact with it. This saturnine impregnation often proves highly prejudicial, especially to delicate constitutions; while the real cause of the complaint is not so much as suspected. For this reason, honey should always be kept in white or brown stone pots or jars: which being glazed with salt, are as free from any noxious quality as the porcelain from China.

842. In a medical view, the finest honey, concentrates the essence of the most salutary flowers; "*and is the most exalted of all*
Balsams"

*Balsams whatever**. But like them it is heating, in what manner soever it be taken; whether as food or physic. It suits chiefly cold and phlegmatic habits; old men; or those who by sickness or other causes abound in gross viscid humours. But to persons of a bilious or hectic † constitution it generally proves inflammatory.

843. It is useful as a detergent ‡ and aperitive, § powerfully dissolving the too sluggish juices, and promoting the expectoration of tough phlegm. A continued use of it as an article of diet, has been found of singular service in the gravel and stone.

844. Where honey proves griping or purgative, the boiling of it will moderate these effects, by diminishing its tendency to fermentation. However salutary honey in general may be, yet there is a peculiarity in some constitutions which renders the least quantity of it highly disagreeable, occasioning excessive sickness and vomiting, and severe griping, nay in some persons, the effects produced by its use resemble those occasioned by poison. || A doubt arises with respect to these cases, whether the noxious quality, might not rather proceed, from some heterogeneous particles or impurities, incorporated with the honey, than from *pure* honey itself. In this branch of physics, as well as in many others, accurate

* *Dr. Leake's Medical Instructions.*

† *Hot or feverish.*

‡ *Cleansing.*

§ *Opening.*

|| *This Medical character of honey is taken from authors of the first eminence.*

accurate and repeated experiments are wanted in order to ascertain the truth.

845. If domestic wines, were made with honey instead of sugar, they would be more similar to foreign wines: they would be of a more delicate flavour; of a more cordial quality, and set lighter upon the stomach. Though honey, when made into Mead, or in any other form, has proved disagreeable to many, yet when made along with fruit, into wine, it has proved to the same persons both agreeable and exhilarating.

To make MEAD, equal to foreign Wines.

846. To every gallon of water, put three pounds of the finest honey: boil it as long as any impurities rise; which are to be carefully skimmed off. It will ferment of itself, but some choose to hasten it with a little yeast, putting therein half of a lemon peel, pared thin. When it is fermented sufficiently, put it into your vessel, and the peel with it: leave a small vent, as long as there seems any degree of fermentation; then add to it half a pound more of honey for every gallon of liquor; and immediately bung it down close. Let it stand six months and then bottle it off for use. If intended to be kept several years, three pounds and a half of honey must be at first put to a gallon of water.

847. As the intention of boiling is only to separate the impurities, and to induce a perfect union of the honey and water. It is self-evident a short boiling will fully answer

swer every purpose. This should be carefully noticed; because the longer the liquor is boiled, the less will it be disposed afterwards to ferment kindly; in consequence of which, instead of being of a vinous quality, it will have a disagreeable luscious sweetness; and not that fine racy flavour, of which it is capable equal to foreign wine.

848. This intention is also frustrated by the injudicious though common practice of making the liquor so strong of the honey as to bear an egg: this renders it a mere stum, and prevents its undergoing that complete and *regular* fermentation, which is necessary to the production of a perfect, uniform vinous liquor.

849. The expressed juices of fruits, and all sugary vegetables, have naturally a spontaneous tendency to ferment into a vinous liquor, without the addition of a ferment. Therefore the quantity of yeast necessary to set the liquor to work is but very trifling, and, if done in warm weather, perhaps it will succeed best without any. If the yeast be not perfectly good and free from any ill flavour, it will be impossible to produce a perfect and effectual fermentation; and whatever ill flavour the yeast is charged with will be communicated to the whole body of the liquor. For which reason it is, that the lemon peel is directed not to be put to the liquor, until the fermentation is begun. For then a very small quantity of any flavourable ingredient will communicate its flavour to a large

large cask of liquor; whereas, if put to it before or after the fermentation, it will be imperceptible.

850. It requires a circumspect attention to mark the progress of the fermentation, that it exceed not the limits of the *vinous*, by running into that of the *acetous*. This is a knowledge acquired only by practical observation made on the liquor, during its progress, and by frequently tasting of it; for as soon as it has acquired the vinous flavour the progress of the fermentation must be stopped, or it will soon turn to the acetous, and therefore at the vinous point the liquor must be tunned up. By this means the heat is lessened, and the progress gradually stopped, the heavier particles condense and subside, while the lighter, by the frequent filling of the cask are thrown out at the bung-hole, and leave the liquor compleatly purged of all matter which might hereafter endanger a pernicious fret, or turbidness. On the contrary, if the liquor happens to be checked in the working, so as not to attain the due degree of fermentation, the motion being lost, the *faces* or *dregs* will not subside, nor will the liquor afterwards become fine or lively. While the liquor is fermenting, the vessel should have such a covering as barely to allow for the escape of the air let loose by the operation.

851. The principles of fermentation are of too extensive a nature to be enlarged further upon in a work like this; what has been delivered

livered will I hope prove of some use, not only in the making of Mead, but of all domestick wines; as also in brewing. People in general having a very confused and imperfect idea of conducting a process which requires great nicety and skill.

CHAPTER XXIII.

How to find BEES in Woods, and to secure them in a HIVE.

852. **T**HE best time to look for them is in the spring, when the fallows, and other plants that afford plenty of farina, are in bloom. If many Bees be seen collecting from these blossoms, or frequently visiting any springs or ponds, it indicates that their habitations are not far off; and if no persons keep any pretty near, it may safely be concluded, that they are wild Bees, and not private property.

853. In order to discover from whence they come, dissolve some red or yellow oker, or any other colouring substance, in water, and dipping some sprigs or grass in this solution, sprinkle the Bees with it as they alight. Wheat flour also or any other coloured powder may be shook or puffed over them, so as to mark them for further examination. For, by observing whether their returns be sooner or later, or whether they assemble in greater or smaller numbers, the distance of their residence

sidence may be guessed with tolerable accuracy. If they return soon, it is probable you may trace them home without much trouble: But if not, take the joint of a large reed, or of elder, force a part of the pith out at one end, put a little honey, or ale and sugar, into it, and stop that end with a cork or paper; then cut a small slit over where the honey lies, that the smell of it may attract the Bees. The pith of the other end is also to be taken out, so as to leave a small partition between the two hollows; this end is to be left open. Place this joint near their haunts, and they will soon be allured to enter into the hollow: when about half a dozen are in stop the open end with your finger. Soon afterwards let one of the Bees out, pursue it as long as it is in sight, then letting another fly, if it continues the same course follow that also: but if any of them take a different route, let another fly, and so proceed until you find several take the same course, and thereby lead you to their abode.

854. If this should happen to be in a hollow tree, &c. (324) and it is desirous to dislodge them, it may be done, as directed (298). Fumigation will oblige them to quit their habitation and treasure. At first issuing out they will be in a great rage, therefore the operator, as well as the bye-standers, must be upon their guard, or they will smart for it. The smoaking a short pipe of tobacco will keep them from the face, or any thing held in the hand that emits a great smoke, will keep them at a proper distance. If they are taken early enough

enough in the honey season to replenish a hive, it will only be necessary to place therein such combs, or part of combs, as have brood in them, fastening them in with spleets in the best manner you can.

855. But if done too late in the season for the Bees to furnish a new habitation with a sufficiency of winter store, the combs must be taken out of the tree, as whole as possible, and placed in an empty hive in the most judicious manner, and similar to what the Bees themselves do. Then putting in the Bees, they will soon secure and repair them to the greatest advantage.

856. Great care however must be taken that the Queen be not killed in the operation. When this happens it may be known by the Bees not working out the next day as others do. In such a case a spare Queen or royal cell must be given them, or they must be united to another Stock; taking the honey yourself in reward for your trouble.

At the latter end of a summer, and when it is not intended to preserve the Bees, but only to take the honey, the process may be shortened; for by only making a sufficient opening in the tree, then drumming and making a great noise about it, to terrify the Bees, (having on the safe-guard 73) you may take out the combs severally, brush the Bees off, and lay the combs in a proper vessel. In all these operations it is necessary that the person who operates should be well defended.

857. If a hive, the inside of which has been rubbed with sugar and ale, or rather a
hive

hive with some empty combs in it, be set during the swarming season, where wild Bees resort, it will probably intice a Swarm to settle therein.

858. Thus have I faithfully finished, to the best of my abilities, the account of the most eligible methods of conducting the various operations relating to these wonderful insects. Wonderful in their nature, properties, and super-eminently useful above all others; affording not only food and medicine, but also a very valuable article to the mechanic and manufacturer; and supplying the absence of the solar light by the splendor and elegance of its illuminations in the habitations of the noble and the opulent. The silk-worm indeed may in some measure vie with the Bees, as adorning by its labour the persons and habitations of the beautiful, the wealthy, and the great. But with respect to the other tribes, our insects are unrivalled in all.

859. Therefore, while we contemplate the *Divine Wisdom* in a display so wonderful and beneficial, let us not forget the *moral* instruction naturally deducible from it: for with the greatest propriety, may be inscribed on every Apiary, *Behold the School of Sobriety, Industry, and Oeconomy!*

F I N I S.

Fig. 1 Page. 3



Fig. 2 P. 16



Fig. 3 P. 16



Fig. 4 P. 13

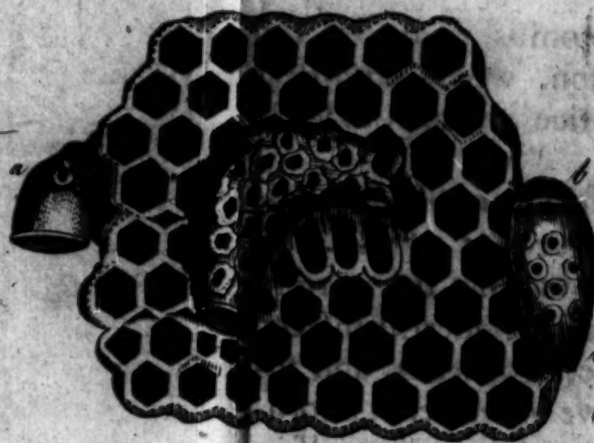


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Fig. 6



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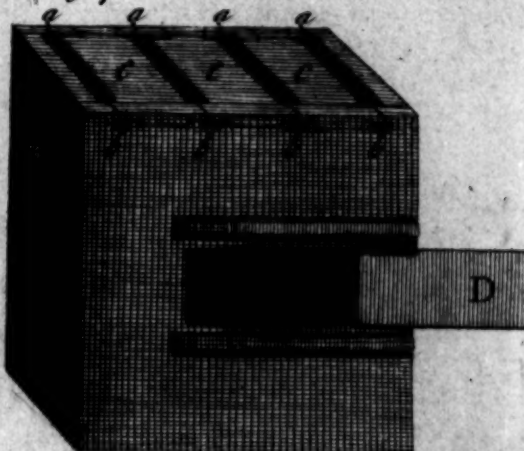


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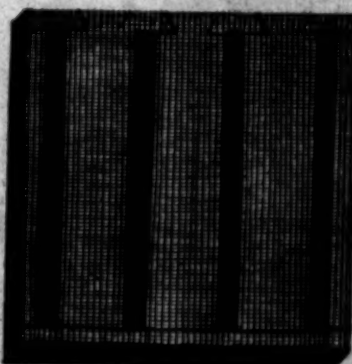


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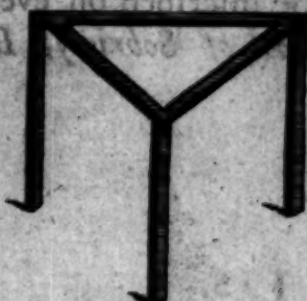


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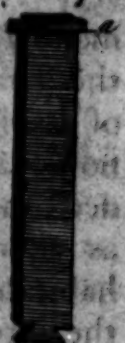
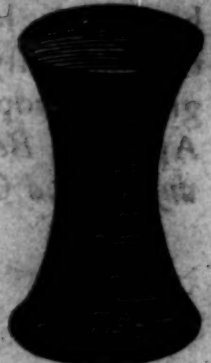


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E R R A T A.

Page 39, line 7, for *of*, read *or*; L 8, for *fig. 6*, read *fig. 8*, *b*; last l. after *fig. 8*, add *c*; p. 47, l. 20, after *fig. 7* add *c, c, c*; p. 48, l. 5, for *braided* read *bradded*; p. 60, l. 17 for *and*, read *at*; *ibid.* l. 4, from the bottom, after *disunion* add, *until the glue is perfectly dry*; p. 62, l. 12, after *to be* read *partially stopped up, leaving a free passage to the grooves, otherwise, &c.* p. 64, for section 187, read 157; p. 65, l. 7, for *Goddy* read *Geddy*; p. 111, l. 6, from the bottom, for *Stock* read *Swarm*; p. 168, l. 16, for *rising* read *resting*; *ibid.* l. 3, from the bottom, for *in sliders* read *sliders in*; p. 169, l. 12, for *burt* read *bunt*; p. 183, l. 10, from the bottom, for *on* read *no*; p. 192, last l. for *glasses* read *board*; p. 197, l. 3, for *is adapted* read *was intended*; p. 219, l. 9, after *Sallows* add *a*; *ibid.* l. 10, from the bottom, for *Garden Fennel* read *Garden Teazel*; p. 221, l. 3, from the bottom, after *sprouts*, add *if permitted to flower*; p. 229, l. 5, for *a quarter of*, read *half*; p. 263, l. 19, after *not* add *that*.

Advertisement.

*** GENTLEMEN who do not reside too far from London, may be furnished by the Author with a pair of straw hives, or of boxes and sliders, of his construction, as standards for others to be made by: for the inferior workmen, especially in country places, are often very deficient in making them of the requisite exactness without a pattern.

The hives, or boxes, to be paid for on delivery, at the *Four Swans Inn, Bishopsgate-Street.*

N. B. Eight or ten days previous notice is requested.